SIEMENS

MICROMASTER 440

Parameter List **Issue 01/06**



User Documentation
6SE6400-5BB00-0BP0

Available Documentation for the MICROMASTER 440

Getting Started Guide

Is for quick commissioning with SDP and BOP.



Operating Instructions

Gives information about features of the MICROMASTER 440, Installation, Commissioning, Control modes, System Parameter structure, Troubleshooting, Specifications and available options of the MICROMASTER 440.



Parameter List

The Parameter List contains the description of all Parameters structured in functional order and a detailed description. The Parameter list also includes a series of function plans.



Catalogues

In the catalogue you will find all needs to select a certain inverter, as well as filters chokes, operator panels or communications options.



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MICROMASTER 440

Parameter List
User Documentation

Valid for	Issue 01/06
Converter Type	*Software Version*
MICROMASTER 440	V2.1

Issue 01/06

Warning
Please refer to all Definitions and Warnings contained in the Operating Instructions. You will find the Operating Instructions on the Docu CD delivered with your inverter. If the CD is lost, it can be ordered via your local Siemens department under the Order No. 6SE6400-5AD00-1AP0.

Information about MICROMASTER 440 is also available from:

Regional Contacts

Please get in touch with your contact for Technical Support in your Region for questions about services, prices and conditions of Technical Support.

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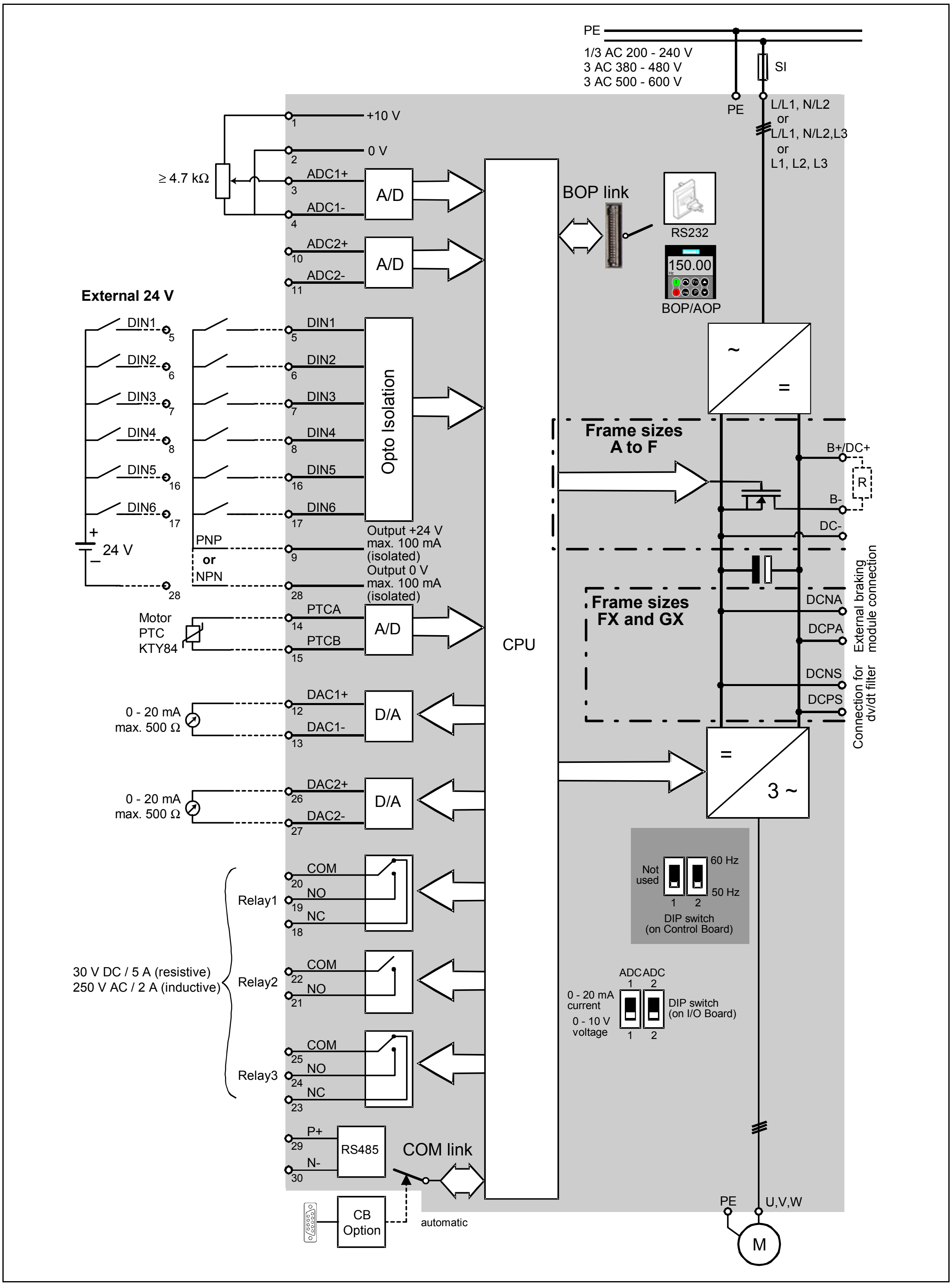
Parameters MICROMASTER 440

This Parameter List must only be used together with the Operating Instructions of the MICROMASTER 440. Please pay special attention to the Warnings, Cautions, Notices and Notes contained in these manuals.

Table of Contents

1 Block Diagram and Terminals

1.1 Block Diagram



1.2 Power Terminals

You can gain access to the mains and motor terminals by removing the front covers.

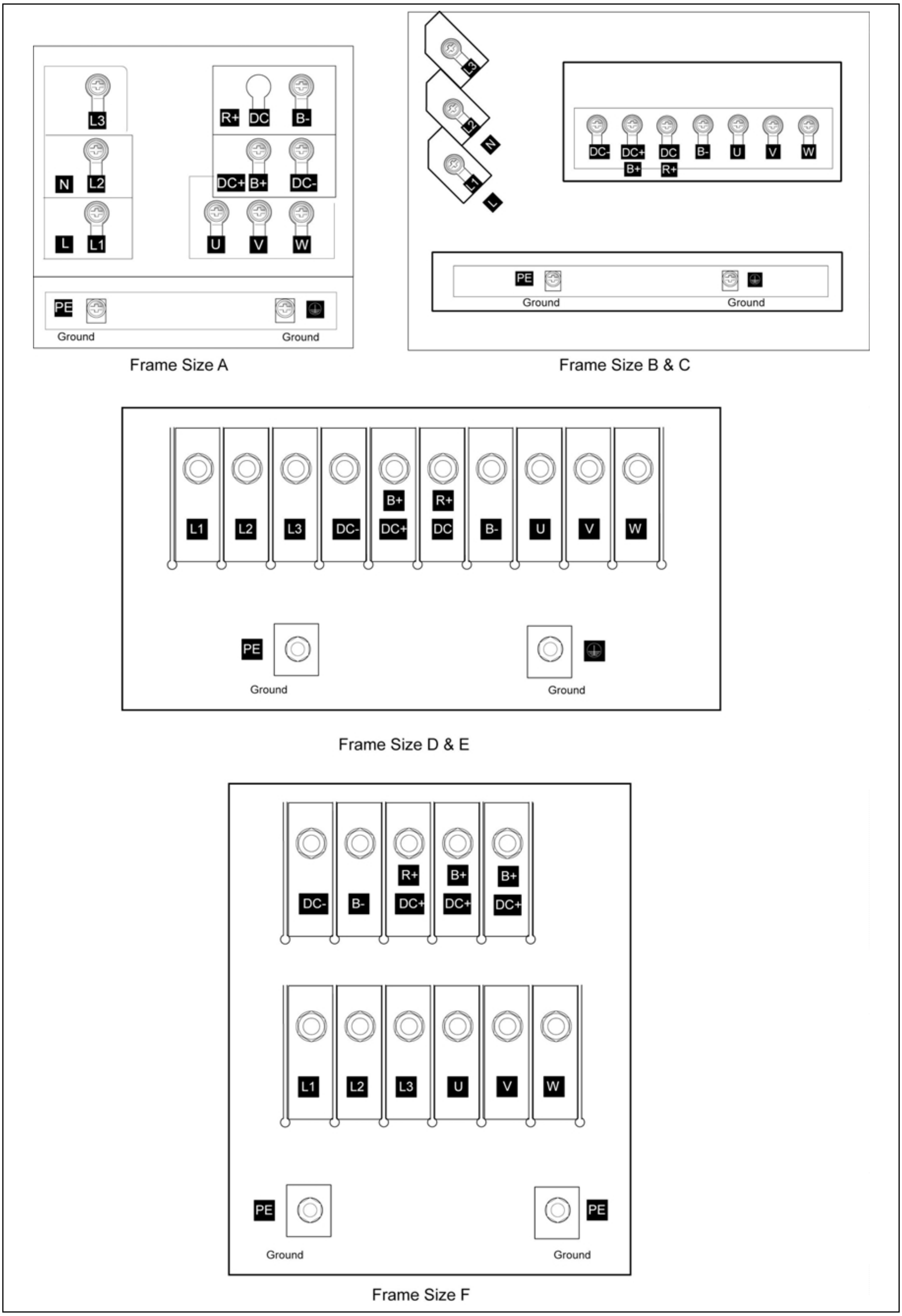


Fig. 1-1 Frame Size A - F

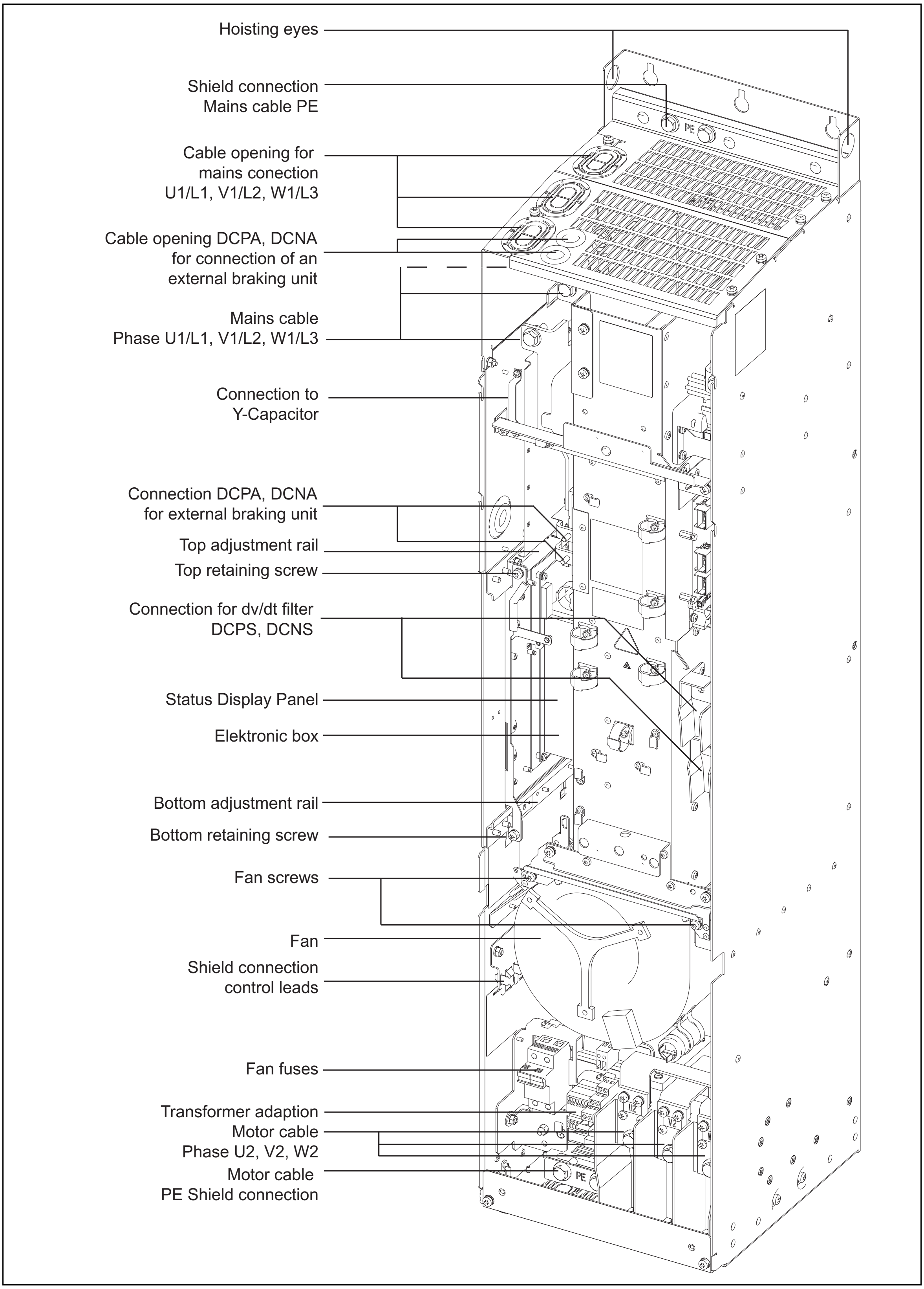


Fig. 1-2 Frame Size FX

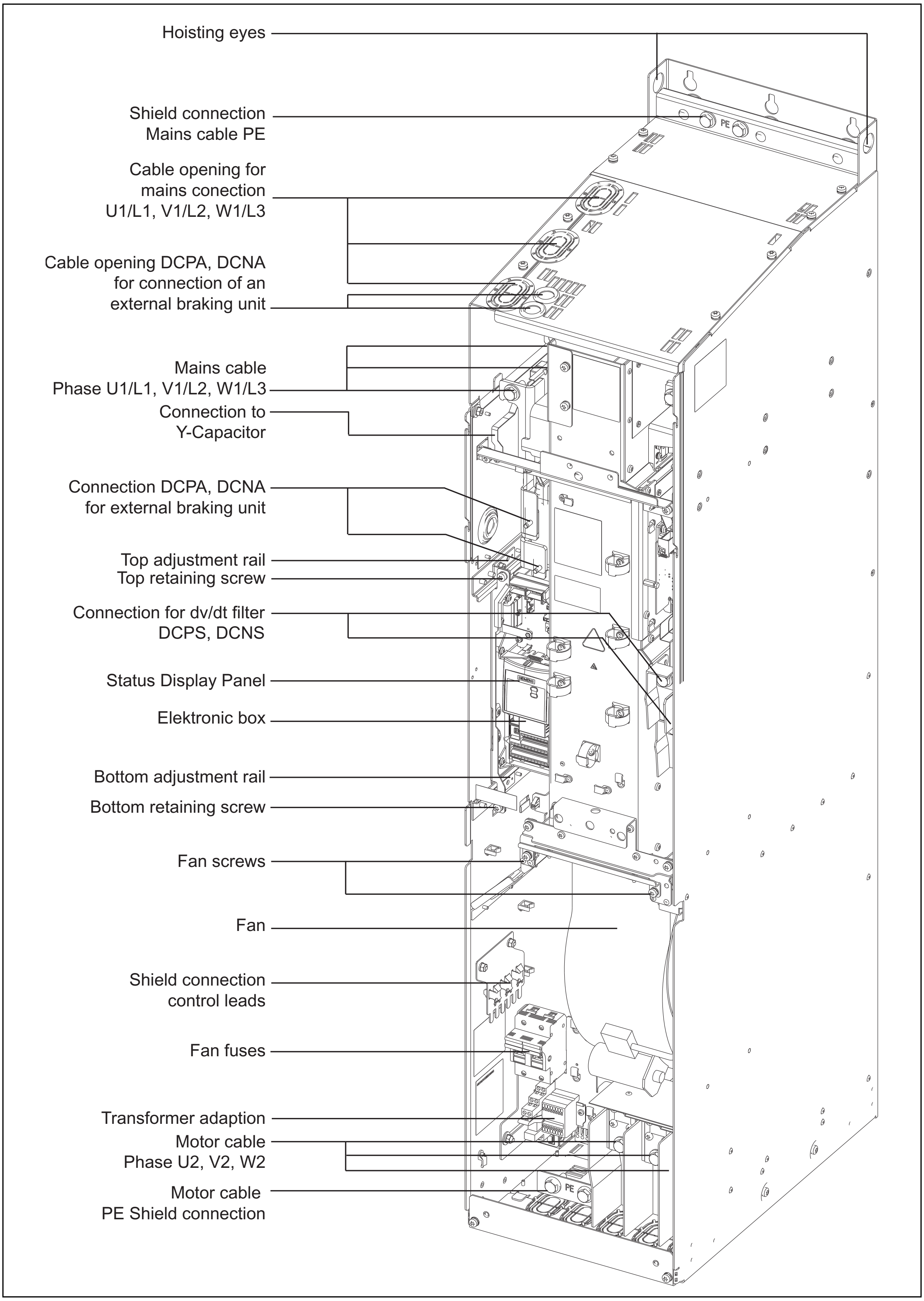


Fig. 1-3 Frame Size GX

1.3 Control Terminals

Terminal	Designation	Function
1	-	Output +10 V
2	-	Output 0 V
3	ADC1+	Analog input 1 (+)
4	ADC1-	Analog input 1 (-)
5	DIN1	Digital input 1
6	DIN2	Digital input 2
7	DIN3	Digital input 3
8	DIN4	Digital input 4
9	-	Isolated output +24 V / max. 100 mA
10	ADC2+	Analog input 2 (+)
11	ADC2-	Analog input 2 (-)
12	DAC1+	Analog output 1 (+)
13	DAC1-	Analog output 1 (-)
14	PTCA	Connection for PTC / KTY84
15	PTCB	Connection for PTC / KTY84
16	DIN5	Digital input 5
17	DIN6	Digital input 6
18	DOUT1/NC	Digital output 1 / NC contact
19	DOUT1/NO	Digital output 1 / NO contact
20	DOUT1/COM	Digital output 1 / Changeover contact
21	DOUT2/NO	Digital output 2 / NO contact
22	DOUT2/COM	Digital output 2 / Changeover contact
23	DOUT3/NC	Digital output 3 / NC contact
24	DOUT3/NO	Digital output 3 / NO contact
25	DOUT3/COM	Digital output 3 / Changeover contact
26	DAC2+	Analog output 2 (+)
27	DAC2-	Analog output 2 (-)
28	-	Isolated output 0 V / max. 100 mA
29	P+	RS485 port
30	P-	RS485 port

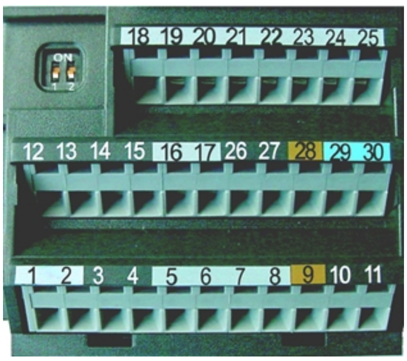


Fig. 1-4 Control terminals of MICROMASTER 440

2 Parameters

2.1 Introduction to MICROMASTER System Parameters

The layout of the parameter description is as follows.

1 Par number [index]	**2 Parameter name**			**9 Min:**	12 Level: **2**
	3 CStat:	**5 Datatype**	**7 Unit:**	**10 Def:**	
	4 P-Group:	**6 active:**	**8 Quick Comm:**	**11 Max:**	
	13	Description:			

1. **Parameter number**
   Indicates the relevant parameter number. The numbers used are 4-digit numbers in the range 0000 to 9999. Numbers prefixed with an "r" indicate that the parameter is a "read-only" parameter, which displays a particular value but cannot be changed directly by specifying a different value via this parameter number (in such cases, dashes "-" are entered at the points "Unit", "Min", "Def" and "Max" in the header of the parameter description.
   All other parameters are prefixed with a "P". The values of these parameters can be changed directly in the range indicated by the "Min" and "Max" settings in the header.

   [index] indicates that the parameter is an indexed parameter and specifies the number of indices available.
2. **Parameter name**
   Indicates the name of the relevant parameter.
   Certain parameter names include the following abbreviated prefixes: BI, BO, CI, and CO followed by a colon.

   These abbreviations have the following meanings:

BI	=	P9999 (0)	Binector input, i.e. parameter selects the source of a binary signal
BO	=	r9999	Binector output, i.e. parameter connects as a binary signal
CI	=	r9999 (999:9)	Connector input, i.e. parameter selects the source of an analog signal
CO	=	r9999 [99]	Connector output, i.e. parameter connects as an analog signal
CO/BO	=	r9999 r9999	Connector/Binector output, i.e. parameter connects as an analog signal and/or as a binary signal

   To make use of BiCo you will need access to the full parameter list. At this level many new parameter settings are possible, including BiCo functionality. BiCo functionality is a different, more flexible way of setting and combining input and output functions. It can be used in most cases in conjunction with the simple, level 2 settings.

   The BiCo system allows complex functions to be programmed. Boolean and mathematical relationships can be set up between inputs (digital, analog, serial etc.) and outputs (inverter current, frequency, analog output, relays, etc.).

3. **CStat**
   Commissioning status of the parameter. Three states are possible:
   Commissioning C
   Run U
   Ready to run T
   This indicates when the parameter can be changed. One, two or all three states may be specified. If all three states are specified, this means that it is possible to change this parameter setting in all three inverter states
4. **P-Group**
   Indicates the functional group of the particular.

   Note
   Parameter P0004 (parameter filter) acts as a filter and focuses access to parameters according to the functional group selected.

5. **Datatype**
   The data types available are shown in the table below.

Notation	Meaning
U16	16-bit unsigned
U32	32-bit unsigned
I16	16-bit integer
I32	32-bit integer
Float	Floating point

6. **Active**
   Indicates whether
   - ♦ Immediately changes to the parameter values take effective immediately after they have been entered, or
   - ♦ Confirm the "P" button on the operator panel (BOP or AOP) must be pressed before the changes take effect.
7. **Unit**
   Indicates the unit of measure applicable to the parameter values
8. **QuickComm**
   Indicates whether or not (Yes or No) a parameter can only be changed during quick commissioning, i.e. when P0010 (parameter groups for commissioning) is set to 1 (quick commissioning).
9. **Min**
   Indicates the minimum value to which the parameter can be set.
10. **Def**
    Indicates the default value, i.e. the value which applies if the user does not specify a particular value for the parameter.
11. **Max**
    Indicates the maximum value to which the parameter can be set.
12. **Level**
    Indicates the level of user access. There are four access levels: Standard, Extended, Expert and Service. The number of parameters that appear in each functional group depends on the access level set in P0003 (user access level).

13. **Description**
The parameter description consists of the sections and contents listed below. Some of these sections and contents are optional and will be omitted on a case-to-case basis if not applicable.

Description: Brief explanation of the parameter function.

Diagram: Where applicable, diagram to illustrate the effects of parameters on a characteristic curve, for example

Settings: List of applicable settings. These include
Possible settings, Most common settings, Index and Bitfields

Example: Optional example of the effects of a particular parameter setting.

Dependency: Any conditions that must be satisfied in connection with this parameter. Also any particular effects, which this parameter has on other parameter(s) or which other parameters have on this one.

Warning / Caution / Notice / Note:
Important information which must be heeded to prevent personal injury or damage to equipment / specific information which should be heeded in order to avoid problems / information which may be helpful to the user

More details: Any sources of more detailed information concerning the particular parameter.

Operators

The following operators are used in the parameter list to represent mathematical interrelationships:

Arithmetic operators

+ Addition
- Subtraction
* Multiplication
/ Division

Comparison operators

> Greater than
>= Greater than / equal to
< Less than
<= Less than / equal to

Equivalence operators

== Equal to
!= Not equal to

Logical operators

&& AND logic operation
|| OR logic operation

2.2 Quick commissioning (P0010 = 1)

The following parameters are necessary for quick commissioning (P0010 = 1).

Quick commissioning (P0010 = 1)

Par.-No.	Name	Access level	Cstat
P0100	Europe / North America	1	C
P0205	Inverter application	3	C
P0300	Select motor type	2	C
P0304	Motor voltage rating	1	C
P0305	Motor current rating	1	C
P0307	Motor power rating	1	C
P0308	Motor cosPhi rating	1	C
P0309	Motor efficiency rating	1	C
P0310	Motor frequency rating	1	C
P0311	Motor speed rating	1	C
P0320	Motor magnetizing current	3	CT
P0335	Motor cooling	2	CT
P0640	Motor overload factor [%]	2	CUT
P0700	Selection of command source	1	CT
P1000	Selection of frequency setpoint	1	CT
P1080	Min. speed	1	CUT
P1082	Max. speed	1	CT
P1120	Ramp-up time	1	CUT
P1121	Ramp-down time	1	CUT
P1135	OFF3 ramp-down time	2	CUT
P1300	Control mode	2	CT
P1500	Selection of torque setpoint	2	CT
P1910	Select motor data identification	2	CT
P1960	Speed control optimisation	3	CT
P3900	End of quick commissioning	1	C

When P0010 = 1 is chosen, P0003 (user access level) can be used to select the parameters to be accessed. This parameter also allows selection of a user-defined parameter list for quick commissioning.

At the end of the quick commissioning sequence, set P3900 = 1 to carry out the necessary motor calculations and clear all other parameters (not included in P0010 = 1) to their default settings.

Note
This applies only in Quick Commissioning mode.

Reset to Factory default

To reset all parameters to the factory default settings; the following parameters should be set as follows:

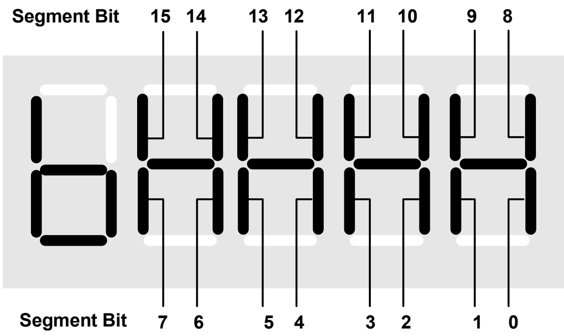
Set P0010 = 30

Set P0970 = 1

Note
The reset process takes approximately 10 seconds to complete. Reset to Factory default

Seven-segment display

The seven-segment display is structured as follows:



The significance of the relevant bits in the display is described in the status and control word parameters.

2.3 Command and Drive Datasets - Overview

Command Datasets (CDS)

ParNo	Parameter text	1)
P0700[3]	Selection of command source	X
P0701[3]	Function of digital input 1	X
P0702[3]	Function of digital input 2	X
P0703[3]	Function of digital input 3	X
P0704[3]	Function of digital input 4	X
P0705[3]	Function of digital input 5	X
P0706[3]	Function of digital input 6	X
P0707[3]	Function of digital input 7	X
P0708[3]	Function of digital input 8	X
P0719[3]	Selection of cmd. & freq. setp.	X
P0731[3]	BI: Function of digital output 1	X
P0732[3]	BI: Function of digital output 2	X
P0733[3]	BI: Function of digital output 3	X
P0800[3]	BI: Download parameter set 0	–
P0801[3]	BI: Download parameter set 1	–
P0840[3]	BI: ON/OFF1	X
P0842[3]	BI: ON reverse/OFF1	X
P0844[3]	BI: 1. OFF2	X
P0845[3]	BI: 2. OFF2	X
P0848[3]	BI: 1. OFF3	X
P0849[3]	BI: 2. OFF3	X
P0852[3]	BI: Pulse enable	X
P1000[3]	Selection of frequency setpoint	X
P1020[3]	BI: Fixed freq. selection Bit 0	X
P1021[3]	BI: Fixed freq. selection Bit 1	X
P1022[3]	BI: Fixed freq. selection Bit 2	X
P1023[3]	BI: Fixed freq. selection Bit 3	X
P1026[3]	BI: Fixed freq. selection Bit 4	X
P1028[3]	BI: Fixed freq. selection Bit 5	X
P1035[3]	BI: Enable MOP (UP-command)	X
P1036[3]	BI: Enable MOP (DOWN-command)	X
P1055[3]	BI: Enable JOG right	X
P1056[3]	BI: Enable JOG left	X
P1070[3]	CI: Main setpoint	X
P1071[3]	CI: Main setpoint scaling	X

ParNo	Parameter text	1)
P1074[3]	BI: Disable additional setpoint	X
P1075[3]	CI: Additional setpoint	X
P1076[3]	CI: Additional setpoint scaling	X
P1110[3]	BI: Inhibit neg. freq. setpoint	X
P1113[3]	BI: Reverse	X
P1124[3]	BI: Enable JOG ramp times	X
P1140[3]	BI: RFG enable	X
P1141[3]	BI: RFG start	X
P1142[3]	BI: RFG enable setpoint	X
P1230[3]	BI: Enable DC braking	X
P1330[3]	CI: Voltage setpoint	X
P1477[3]	BI: Set integrator of n-ctrl.	X
P1478[3]	CI: Set integrator value n-ctrl.	X
P1500[3]	Selection of torque setpoint	X
P1501[3]	BI: Change to torque control	X
P1503[3]	CI: Torque setpoint	X
P1511[3]	CI: Additional torque setpoint	X
P1522[3]	CI: Upper torque limit	–
P1523[3]	CI: Lower torque limit	–
P2103[3]	BI: 1. Faults acknowledgement	X
P2104[3]	BI: 2. Faults acknowledgement	X
P2106[3]	BI: External fault	X
P2200[3]	BI: Enable PID controller	–
P2220[3]	BI: Fixed PID setp. select Bit 0	X
P2221[3]	BI: Fixed PID setp. select Bit 1	X
P2222[3]	BI: Fixed PID setp. select Bit 2	X
P2223[3]	BI: Fixed PID setp. select Bit 3	X
P2226[3]	BI: Fixed PID setp. select Bit 4	X
P2228[3]	BI: Fixed PID setp. select Bit 5	X
P2235[3]	BI: Enable PID-MOP (UP-cmd)	X
P2236[3]	BI: Enable PID-MOP (DOWN-cmd)	X
P2253[3]	CI: PID setpoint	X
P2254[3]	CI: PID trim source	X
P2264[3]	CI: PID feedback	X

1) X = Parameters will be altered during data set switchover (CDS) in the state "Run"
– = Parameters will be altered in the state "Ready" only

Drive Datasets (DDS)

ParNo	Parameter text
P0005[3]	Display selection
r0035[3]	CO: Act. motor temperature
P0291[3]	Inverter protection
P0300[3]	Select motor type
P0304[3]	Rated motor voltage
P0305[3]	Rated motor current
P0307[3]	Rated motor power
P0308[3]	Rated motor cosPhi
P0309[3]	Rated motor efficiency
P0310[3]	Rated motor frequency
P0311[3]	Rated motor speed
r0313[3]	Motor pole pairs
P0314[3]	Motor pole pair number
P0320[3]	Motor magnetizing current
r0330[3]	Rated motor slip
r0331[3]	Rated magnetization current
r0332[3]	Rated power factor
r0333[3]	Rated motor torque
P0335[3]	Motor cooling
P0340[3]	Calculation of motor parameters
P0341[3]	Motor inertia [kg*m^2]
P0342[3]	Total/motor inertia ratio
P0344[3]	Motor weight
r0345[3]	Motor start-up time
P0346[3]	Magnetization time
P0347[3]	Demagnetization time
P0350[3]	Stator resistance (line-to-line)
P0352[3]	Cable resistance
P0354[3]	Rotor resistance
P0356[3]	Stator leakage inductance
P0358[3]	Rotor leakage inductance
P0360[3]	Main inductance
P0362[3]	Magnetizing curve flux 1
P0363[3]	Magnetizing curve flux 2
P0364[3]	Magnetizing curve flux 3
P0365[3]	Magnetizing curve flux 4
P0366[3]	Magnetizing curve imag 1
P0367[3]	Magnetizing curve imag 2
P0368[3]	Magnetizing curve imag 3
P0369[3]	Magnetizing curve imag 4

ParNo	Parameter text
r0370[3]	Stator resistance [%]
r0372[3]	Cable resistance [%]
r0373[3]	Rated stator resistance [%]
r0374[3]	Rotor resistance [%]
r0376[3]	Rated rotor resistance [%]
r0377[3]	Total leakage reactance [%]
r0382[3]	Main reactance [%]
r0384[3]	Rotor time constant
r0386[3]	Total leakage time constant
P0400[3]	Select encoder type
P0408[3]	Encoder pulses per revolution
P0491[3]	Reaction on freq. signal loss
P0492[3]	Allowed frequency difference
P0494[3]	Delay frequency loss reaction
P0500[3]	Technological application
P0530[3]	Unit for positioning signal
P0531[3]	Unit conversion
P0601[3]	Motor temperature sensor
P0604[3]	Threshold motor temperature
P0625[3]	Ambient motor temperature
P0626[3]	Overtemperature stator iron
P0627[3]	Overtemperature stator winding
P0628[3]	Overtemperature rotor winding
r0630[3]	CO: Ambient temperature
r0631[3]	CO: Stator iron temperature
r0632[3]	CO: Stator winding temperature
r0633[3]	CO: Rotor winding temperature
P0640[3]	Motor overload factor [%]
P1001[3]	Fixed frequency 1
P1002[3]	Fixed frequency 2
P1003[3]	Fixed frequency 3
P1004[3]	Fixed frequency 4
P1005[3]	Fixed frequency 5
P1006[3]	Fixed frequency 6
P1007[3]	Fixed frequency 7
P1008[3]	Fixed frequency 8
P1009[3]	Fixed frequency 9
P1010[3]	Fixed frequency 10
P1011[3]	Fixed frequency 11
P1012[3]	Fixed frequency 12

ParNo	Parameter text
P1013[3]	Fixed frequency 13
P1014[3]	Fixed frequency 14
P1015[3]	Fixed frequency 15
P1031[3]	Setpoint memory of the MOP
P1040[3]	Setpoint of the MOP
P1058[3]	JOG frequency right
P1059[3]	JOG frequency left
P1060[3]	JOG ramp-up time
P1061[3]	JOG ramp-down time
P1080[3]	Min. frequency
P1082[3]	Max. frequency
P1091[3]	Skip frequency 1
P1092[3]	Skip frequency 2
P1093[3]	Skip frequency 3
P1094[3]	Skip frequency 4
P1101[3]	Skip frequency bandwidth
P1120[3]	Ramp-up time
P1121[3]	Ramp-down time
P1130[3]	Ramp-up initial rounding time
P1131[3]	Ramp-up final rounding time
P1132[3]	Ramp-down initial rounding time
P1133[3]	Ramp-down final rounding time
P1134[3]	Rounding type
P1135[3]	OFF3 ramp-down time
P1202[3]	Motor-current: Flying start
P1203[3]	Search rate: Flying start
P1232[3]	DC braking current
P1233[3]	Duration of DC braking
P1234[3]	DC braking start frequency
P1236[3]	Compound braking current
P1240[3]	Configuration of Vdc controller
P1243[3]	Dynamic factor of Vdc-max
P1245[3]	Switch on level kin. buffering
r1246[3]	CO:Switch-on level kin buffering
P1247[3]	Dyn. factor of kinetic buffering
P1250[3]	Gain of Vdc-controller
P1251[3]	Integration time Vdc-controller
P1252[3]	Differential time Vdc-controller
P1253[3]	Vdc-controller output limitation
P1256[3]	Reaction of kinetic buffering

ParNo	Parameter text
P1257[3]	Freq limit for kinetic buffering
P1300[3]	Control mode
P1310[3]	Continuous boost
P1311[3]	Acceleration boost
P1312[3]	Starting boost
P1316[3]	Boost end frequency
P1320[3]	Programmable V/f freq. coord. 1
P1321[3]	Programmable V/f volt. coord. 1
P1322[3]	Programmable V/f freq. coord. 2
P1323[3]	Programmable V/f volt. coord. 2
P1324[3]	Programmable V/f freq. coord. 3
P1325[3]	Programmable V/f volt. coord. 3
P1333[3]	Start frequency for FCC
P1335[3]	Slip compensation
P1336[3]	Slip limit
P1338[3]	Resonance damping gain V/f
P1340[3]	Imax freq. controller prop. gain
P1341[3]	Imax freq. ctrl. integral time
P1345[3]	Imax voltage ctrl. prop. gain
P1346[3]	Imax voltage ctrl. integral time
P1350[3]	Voltage soft start
P1400[3]	Configuration of speed control
P1442[3]	Filter time for act. speed
P1452[3]	Filter time for act. freq (SLVC)
P1460[3]	Gain speed controller
P1462[3]	Integral time speed controller
P1470[3]	Gain speed controller (SLVC)
P1472[3]	Integral time n-ctrl. (SLVC)
P1488[3]	Droop input source
P1489[3]	Droop scaling
P1492[3]	Enable droop
P1496[3]	Scaling accel. precontrol
P1499[3]	Scaling accel. torque control
P1520[3]	CO: Upper torque limit
P1521[3]	CO: Lower torque limit
P1525[3]	Scaling lower torque limit
P1530[3]	Motoring power limitation
P1531[3]	Regenerative power limitation
P1570[3]	CO: Fixed value flux setpoint
P1574[3]	Dynamic voltage headroom

ParNo	Parameter text
P1580[3]	Efficiency optimization
P1582[3]	Smooth time for flux setpoint
P1596[3]	Int. time field weak. controller
P1610[3]	Continuous torque boost (SLVC)
P1611[3]	Acc. torque boost (SLVC)
P1654[3]	Smooth time for Isq setpoint
P1715[3]	Gain current controller
P1717[3]	Integral time current controller
P1745[3]	Variance flux error
P1750[3]	Control word of motor model
P1755[3]	Start-freq. motor model (SLVC)
P1756[3]	Hyst.-freq. motor model (SLVC)
P1758[3]	Chng-ov. del. t SLVC op.-lp ctrl
P1759[3]	Chng-ov. del. t SLVC cl.-lp ctrl
P1764[3]	Kp of n-adaption (SLVC)
P1767[3]	Tn of n-adaption (SLVC)
P1780[3]	Control word of Rs/Rr-adaption
P1781[3]	Tn of Rs-adaption
P1786[3]	Tn of Xm-adaption
P1803[3]	Max. modulation
P1820[3]	Reverse output phase sequence
P1909[3]	Ctrl. word of motor data ident.
P2000[3]	Reference frequency
P2001[3]	Reference voltage
P2002[3]	Reference current
P2003[3]	Reference torque
P2004[3]	Reference power
P2150[3]	Hysteresis frequency f_hys
P2153[3]	Time-constant frequency filter
P2155[3]	Threshold frequency f_1
P2156[3]	Delay time of threshold freq f_1
P2157[3]	Threshold frequency f_2
P2158[3]	Delay time of threshold freq f_2
P2159[3]	Threshold frequency f_3
P2160[3]	Delay time of threshold freq f_3
P2161[3]	Min. threshold for freq. setp.
P2162[3]	Hysteresis freq. for overfreq.
P2163[3]	Entry freq. for perm. deviation
P2164[3]	Hysteresis frequency deviation
P2165[3]	Delay time permitted deviation
P2166[3]	Delay time ramp up completed
P2167[3]	Switch-off frequency f_off
P2168[3]	Delay time T_off

ParNo	Parameter text
P2170[3]	Threshold current I_thresh
P2171[3]	Delay time current
P2172[3]	Threshold DC-link voltage
P2173[3]	Delay time DC-link voltage
P2174[3]	Torque threshold M_thresh
P2176[3]	Delay time for torque threshold
P2177[3]	Delay time for motor is blocked
P2178[3]	Delay time for motor pulled out
P2181[3]	Belt failure detection mode
P2182[3]	Belt threshold frequency 1
P2183[3]	Belt threshold frequency 2
P2184[3]	Belt threshold frequency 3
P2185[3]	Upper torque threshold 1
P2186[3]	Lower torque threshold 1
P2187[3]	Upper torque threshold 2
P2188[3]	Lower torque threshold 2
P2189[3]	Upper torque threshold 3
P2190[3]	Lower torque threshold 3
P2192[3]	Time delay for belt failure
P2201[3]	Fixed PID setpoint 1
P2202[3]	Fixed PID setpoint 2
P2203[3]	Fixed PID setpoint 3
P2204[3]	Fixed PID setpoint 4
P2205[3]	Fixed PID setpoint 5
P2206[3]	Fixed PID setpoint 6
P2207[3]	Fixed PID setpoint 7
P2208[3]	Fixed PID setpoint 8
P2209[3]	Fixed PID setpoint 9
P2210[3]	Fixed PID setpoint 10
P2211[3]	Fixed PID setpoint 11
P2212[3]	Fixed PID setpoint 12
P2213[3]	Fixed PID setpoint 13
P2214[3]	Fixed PID setpoint 14
P2215[3]	Fixed PID setpoint 15
P2231[3]	Setpoint memory of PID-MOP
P2240[3]	Setpoint of PID-MOP
P2480[3]	Position mode
P2481[3]	Gearbox ratio input
P2482[3]	Gearbox ratio output
P2484[3]	No. of shaft turns = 1 Unit
P2487[3]	Positional error trim value
P2488[3]	Distance / No. of revolutions

2.4 Binector Input Parameters

ParNo	Parameter text
P0731[3]	BI: Function of digital output 1
P0732[3]	BI: Function of digital output 2
P0733[3]	BI: Function of digital output 3
P0800[3]	BI: Download parameter set 0
P0801[3]	BI: Download parameter set 1
P0810	BI: CDS bit 0 (Local / Remote)
P0811	BI: CDS bit 1
P0820	BI: DDS bit 0
P0821	BI: DDS bit 1
P0840[3]	BI: ON/OFF1
P0842[3]	BI: ON reverse/OFF1
P0844[3]	BI: 1. OFF2
P0845[3]	BI: 2. OFF2
P0848[3]	BI: 1. OFF3
P0849[3]	BI: 2. OFF3
P0852[3]	BI: Pulse enable
P1020[3]	BI: Fixed freq. selection Bit 0
P1021[3]	BI: Fixed freq. selection Bit 1
P1022[3]	BI: Fixed freq. selection Bit 2
P1023[3]	BI: Fixed freq. selection Bit 3
P1026[3]	BI: Fixed freq. selection Bit 4
P1028[3]	BI: Fixed freq. selection Bit 5
P1035[3]	BI: Enable MOP (UP-command)
P1036[3]	BI: Enable MOP (DOWN-command)
P1055[3]	BI: Enable JOG right
P1056[3]	BI: Enable JOG left
P1074[3]	BI: Disable additional setpoint
P1110[3]	BI: Inhibit neg. freq. setpoint
P1113[3]	BI: Reverse
P1124[3]	BI: Enable JOG ramp times
P1140[3]	BI: RFG enable
P1141[3]	BI: RFG start
P1142[3]	BI: RFG enable setpoint
P1230[3]	BI: Enable DC braking
P1477[3]	BI: Set integrator of n-ctrl.

ParNo	Parameter text
P1501[3]	BI: Change to torque control
P2103[3]	BI: 1. Faults acknowledgement
P2104[3]	BI: 2. Faults acknowledgement
P2106[3]	BI: External fault
P2200[3]	BI: Enable PID controller
P2220[3]	BI: Fixed PID setp. select Bit 0
P2221[3]	BI: Fixed PID setp. select Bit 1
P2222[3]	BI: Fixed PID setp. select Bit 2
P2223[3]	BI: Fixed PID setp. select Bit 3
P2226[3]	BI: Fixed PID setp. select Bit 4
P2228[3]	BI: Fixed PID setp. select Bit 5
P2235[3]	BI: Enable PID-MOP (UP-cmd)
P2236[3]	BI: Enable PID-MOP (DOWN-cmd)
P2810[2]	BI: AND 1
P2812[2]	BI: AND 2
P2814[2]	BI: AND 3
P2816[2]	BI: OR 1
P2818[2]	BI: OR 2
P2820[2]	BI: OR 3
P2822[2]	BI: XOR 1
P2824[2]	BI: XOR 2
P2826[2]	BI: XOR 3
P2828	BI: NOT 1
P2830	BI: NOT 2
P2832	BI: NOT 3
P2834[4]	BI: D-FF 1
P2837[4]	BI: D-FF 2
P2840[2]	BI: RS-FF 1
P2843[2]	BI: RS-FF 2
P2846[2]	BI: RS-FF 3
P2849	BI: Timer 1
P2854	BI: Timer 2
P2859	BI: Timer 3
P2864	BI: Timer 4

2.5 Connector Input Parameters

ParNo	Parameter text
P0095[10]	CI: Display PZD signals
P0771[2]	CI: DAC
P1070[3]	CI: Main setpoint
P1071[3]	CI: Main setpoint scaling
P1075[3]	CI: Additional setpoint
P1076[3]	CI: Additional setpoint scaling
P1330[3]	CI: Voltage setpoint
P1478[3]	CI: Set integrator value n-ctrl.
P1503[3]	CI: Torque setpoint
P1511[3]	CI: Additional torque setpoint
P1522[3]	CI: Upper torque limit
P1523[3]	CI: Lower torque limit
P2016[8]	CI: PZD to BOP link (USS)
P2019[8]	CI: PZD to COM link (USS)
P2051[8]	CI: PZD to CB

ParNo	Parameter text
P2253[3]	CI: PID setpoint
P2254[3]	CI: PID trim source
P2264[3]	CI: PID feedback
P2869[2]	CI: ADD 1
P2871[2]	CI: ADD 2
P2873[2]	CI: SUB 1
P2875[2]	CI: SUB 2
P2877[2]	CI: MUL 1
P2879[2]	CI: MUL 2
P2881[2]	CI: DIV 1
P2883[2]	CI: DIV 2
P2885[2]	CI: CMP 1
P2887[2]	CI: CMP 2

2.6 Binector Output Parameters

ParNo	Parameter text
r0751	BO: Status word of ADC
r2032	BO: CtrlWrd1 from BOP link (USS)
r2033	BO: CtrlWrd2 from BOP link (USS)
r2036	BO: CtrlWrd1 from COM link (USS)
r2037	BO: CtrlWrd2 from COM link (USS)
r2090	BO: Control word 1 from CB
r2091	BO: Control word 2 from CB
r2811	BO: AND 1
r2813	BO: AND 2
r2815	BO: AND 3
r2817	BO: OR 1
r2819	BO: OR 2
r2821	BO: OR 3
r2823	BO: XOR 1
r2825	BO: XOR 2
r2827	BO: XOR 3
r2829	BO: NOT 1
r2831	BO: NOT 2
r2833	BO: NOT 3
r2835	BO: Q D-FF 1

ParNo	Parameter text
r2836	BO: NOT-Q D-FF 1
r2838	BO: Q D-FF 2
r2839	BO: NOT-Q D-FF 2
r2841	BO: Q RS-FF 1
r2842	BO: NOT-Q RS-FF 1
r2844	BO: Q RS-FF 2
r2845	BO: NOT-Q RS-FF 2
r2847	BO: Q RS-FF 3
r2848	BO: NOT-Q RS-FF 3
r2852	BO: Timer 1
r2853	BO: Nout timer 1
r2857	BO: Timer 2
r2858	BO: Nout timer 2
r2862	BO: Timer 3
r2863	BO: Nout timer 3
r2867	BO: Timer 4
r2868	BO: Nout timer 4
r2886	BO: CMP 1
r2888	BO: CMP 2

2.7 Connector Output Parameters

ParNo	Parameter text
r0020	CO: Freq. setpoint before RFG
r0021	CO: Act. filtered frequency
r0024	CO: Act. filtered output freq.
r0025	CO: Act. filtered output voltage
r0026	CO: Act. filtered DC-link volt.
r0027	CO: Act. filtered output current
r0029	CO: Flux gen. current
r0030	CO: Torque gen. current
r0031	CO: Act. filtered torque
r0032	CO: Act. filtered power
r0035[3]	CO: Act. motor temperature
r0036	CO:Inverter overload utilization
r0037[5]	CO: Inverter temperature [°C]
r0038	CO: Act. power factor
r0039	CO: Energy consumpt. meter [kWh]
r0050	CO: Active command data set
r0051[2]	CO: Active drive data set (DDS)
r0061	CO: Act. encoder frequency
r0062	CO: Freq. setpoint
r0063	CO: Act. frequency
r0064	CO: Dev. frequency controller
r0065	CO: Slip frequency
r0066	CO: Act. output frequency
r0067	CO: Act. output current limit
r0068	CO: Output current
r0069[6]	CO: Act. phase currents
r0070	CO: Act. DC-link voltage
r0071	CO: Max. output voltage
r0072	CO: Act. output voltage
r0074	CO: Act. modulation
r0075	CO: Current setpoint Isd
r0076	CO: Act. current Isd
r0077	CO: Current setpoint Isq
r0078	CO: Act. current Isq
r0079	CO: Torque setpoint (total)
r0080	CO: Act. torque
r0084	CO: Act. air gap flux
r0086	CO: Act. active current
r0090	CO: Act. rotor angle
r0394	CO: Stator resistance IGBT [%]

ParNo	Parameter text
r0395	CO: Total stator resistance [%]
r0396	CO: Act. rotor resistance
r0630[3]	CO: Ambient temperature
r0631[3]	CO: Stator iron temperature
r0632[3]	CO: Stator winding temperature
r0633[3]	CO: Rotor winding temperature
r0755[2]	CO: Act. ADC after scal. [4000h]
r0947[8]	CO: Letzte Fehlermeldung
r0948[12]	CO: Fehlerzeit
r0949[8]	CO: Fehlerwert
r1024	CO: Act. fixed frequency
r1050	CO: Act. Output freq. of the MOP
r1078	CO: Total frequency setpoint
r1079	CO: Selected frequency setpoint
r1114	CO: Freq. setp. after dir. ctrl.
r1119	CO: Freq. setpoint before RFG
r1170	CO: Frequency setpoint after RFG
r1242	CO: Switch-on level of Vdc-max
r1246[3]	CO:Switch-on level kin buffering
r1315	CO: Total boost voltage
r1337	CO: V/f slip frequency
r1343	CO: Imax controller freq. output
r1344	CO: Imax controller volt. output
r1438	CO: Freq. setpoint to controller
r1445	CO: Act. filtered frequency
r1482	CO: Integral output of n-ctrl.
r1490	CO: Droop frequency
r1508	CO: Torque setpoint
r1515	CO: Additional torque setpoint
r1518	CO: Acceleration torque
P1520[3]	CO: Upper torque limit
P1521[3]	CO: Lower torque limit
r1526	CO: Upper torque limitation
r1527	CO: Lower torque limitation
r1536	CO: Max. trq. motoring current
r1537	CO: Max trq regenerative current
r1538	CO: Upper torque limit (total)
r1539	CO: Lower torque limit (total)
P1570[3]	CO: Fixed value flux setpoint
r1583	CO: Flux setpoint (smoothed)

ParNo	Parameter text
r1597	CO: Outp. field weak. controller
r1598	CO: Flux setpoint (total)
r1718	CO: Output of Isq controller
r1719	CO: Integral output of Isq ctrl.
r1723	CO: Output of Isd controller
r1724	CO: Integral output of Isd ctrl.
r1725	CO: Integral limit of Isd ctrl.
r1728	CO: Decoupling voltage
r1770	CO: Prop. output of n-adaption
r1746	CO: Flussabweichung
r1771	CO: Int. output of n-adaption
r1778	CO: Flux angle difference
r1801	CO: Act. pulse frequency
r2015[8]	CO: PZD from BOP link (USS)
r2018[8]	CO: PZD from COM link (USS)

ParNo	Parameter text
r2050[8]	CO: PZD from CB
r2169	CO: Act. filtered frequency
r2224	CO: Act. fixed PID setpoint
r2250	CO: Output setpoint of PID-MOP
r2260	CO: PID setpoint after PID-RFG
r2262	CO: Filtered PID setp. after RFG
r2266	CO: PID filtered feedback
r2272	CO: PID scaled feedback
r2273	CO: PID error
r2294	CO: Act. PID output
r2870	CO: ADD 1
r2872	CO: ADD 2
r2874	CO: SUB 1
r2876	CO: SUB 2
r2878	CO: MUL 1
r2880	CO: MUL 2
r2882	CO: DIV 1
r2884	CO: DIV 2
P2889	CO: Fixed setpoint 1 in [%]
P2890	CO: Fixed setpoint 2 in [%]

2.8 Connector/Binector Output Parameters

ParNo	Parameter text
r0019	CO/BO: BOP control word
r0052	CO/BO: Act. status word 1
r0053	CO/BO: Act. status word 2
r0054	CO/BO: Act. control word 1
r0055	CO/BO: Act. control word 2

ParNo	Parameter text
r0056	CO/BO: Status of motor control
r0403	CO/BO: Encoder status word
r0722	CO/BO: Binary input values
r0747	CO/BO: State of digital outputs
r0785	CO/BO: Zustand Analogausgang
r1407	CO/BO: Status 2 of motor control
r2197	CO/BO: Monitoring word 1
r2198	CO/BO: Monitoring word 2

3 Parameter Description

Note

Level 4 Parameters are not visible with BOP or AOP.

3.1 Common parameters

r0000 Drive display

	Datatype: U16	Unit: -	Min: -	Level
P-Group: ALWAYS			Def: -	1
			Max: -	

Displays the user selected output as defined in P0005.

Note:

Pressing the "Fn" button for 2 seconds allows the user to view the values of DC link voltage, output frequency, output voltage, output current, and chosen r0000 setting (defined in P0005).

r0002 Drive state

	Datatype: U16	Unit: -	Min: -	Level
P-Group: COMMANDS			Def: -	2
			Max: -	

Displays actual drive state.

Possible Settings:

0 Commissioning mode (P0010 != 0)
1 Drive ready
2 Drive fault active
3 Drive starting (DC-link precharging)
4 Drive running
5 Stopping (ramping down)

Dependency:

State 3 visible only while precharging DC link, and when externally powered communications board is fitted.

P0003 User access level

CStat: CUT	Datatype: U16	Unit: -	Min: 0	Level
P-Group: ALWAYS	Active: first confirm	QuickComm.: No	Def: 1	1
			Max: 4	

Defines user access level to parameter sets. The default setting (standard) is sufficient for most simple applications.

Possible Settings:

0 User defined parameter list - see P0013 for details on use
1 Standard: Allows access into most frequently used parameters.
2 Extended: Allows extended access e.g. to inverter I/O functions.
3 Expert: For expert use only.
4 Service: Only for use by authorized service personal - password protected.

P0004 Parameter filter

CStat: CUT	Datatype: U16	Unit: -	Min: 0	Level
P-Group: ALWAYS	Active: first confirm	QuickComm.: No	Def: 0	1
			Max: 22	

Filters available parameters according to functionality to enable a more focussed approach to commissioning.

Possible Settings:

0 All parameters
2 Inverter
3 Motor
4 Speed sensor
5 Technol. application / units
7 Commands, binary I/O
8 ADC and DAC
10 Setpoint channel / RFG
12 Drive features
13 Motor control
20 Communication
21 Alarms / warnings / monitoring
22 Technology controller (e.g. PID)

Example:

P0004 = 22 specifies that only PID parameters will be visible.

Dependency:

The parameters are sub-divided into groups (P-Group) according to their functionality. This increases the transparency and allows a parameter to be quickly searched for. Furthermore, parameter P0004 can be used to control the ability to be visualized for the operator panel.

Value	P-Group	Group	Parameter area
0	ALWAYS	All parameters	
2	INVERTER	Drive inverter parameters	0200 0299
3	MOTOR	Motor parameters	0300 ... 0399 + 0600 0699
4	ENCODER	Speed encoder	0400 0499
5	TECH_APL	Technical applications / units	0500 0599
7	COMMANDS	Control commands, digital I/O	0700 .... 0749 + 0800 ... 0899
8	TERMINAL	Analog inputs/outputs	0750 0799
10	SETPOINT	Setpoint channel and ramp-function gen.	1000 1199
12	FUNC	Drive inverter functions	1200 1299
13	CONTROL	Motor open-loop/closed-loop control	1300 1799
20	COMM	Communications	2000 2099
21	ALARMS	Faults, warnings, monitoring functions	2100 2199
22	TECH	Technological controller (PID controller)	2200 2399

Parameters marked "Quick Comm: Yes" in the parameter header can only be set when P0010 = 1 (Quick Commissioning).

P0005[3] Display selection

CStat: CUT	**Datatype:** U16	**Unit:** -	**Min:** 2 **Def:** 21 **Max:** 4000	Level **2**
P-Group: FUNC	**Active:** first confirm	**QuickComm.:** No		

Selects display for parameter r0000 (drive display).

Index:

P0005[0] : 1st. Drive data set (DDS)
P0005[1] : 2nd. Drive data set (DDS)
P0005[2] : 3rd. Drive data set (DDS)

Common Settings:

21 Actual frequency
25 Output voltage
26 DC link voltage
27 Output current

Notice:

These settings refer to read only parameter numbers ("rxxxx").

Details:

See relevant "rxxxx" parameter descriptions.

P0006 Display mode

CStat: CUT	**Datatype:** U16	**Unit:** -	**Min:** 0 **Def:** 2 **Max:** 4	Level **3**
P-Group: FUNC	**Active:** first confirm	**QuickComm.:** No		

Defines mode of display for r0000 (drive display).

Possible Settings:

0 In Ready state alternate between setpoint and output frequency. In run display output frequency
1 In Ready state display setpoint. In run display output frequency.
2 In Ready state alternate between P0005 value and r0020 value. In run display P0005 value
3 In Ready state alternate between r0002 value and r0020 value. In run display r0002 value
4 In all states just display P0005

Note:

- When inverter is not running, the display alternates between the values for "Not Running" and "Running".
- Per default, the setpoint and actual frequency values are displayed alternately.

P0007 Backlight delay time

CStat: CUT	**Datatype:** U16	**Unit:** -	**Min:** 0 **Def:** 0 **Max:** 2000	Level **3**
P-Group: FUNC	**Active:** first confirm	**QuickComm.:** No		

Defines time period after which the backlight display turns off if no operator keys have been pressed.

Value:

P0007 = 0:
Backlight always on (default state).

P0007 = 1 - 2000:
Number of seconds after which the backlight will turn off.

P0010	Commissioning parameter				Min: 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -		**Def:** 0	**1**
	P-Group: ALWAYS	**Active:** first confirm	**QuickComm.:** No		**Max:** 30	

Filters parameters so that only those related to a particular functional group are selected.

Possible Settings:

0 Ready
1 Quick commissioning
2 Inverter
29 Download
30 Factory setting

Dependency:

- Reset to 0 for inverter to run.
- P0003 (user access level) also determines access to parameters.

Note:

P0010 = 1
The inverter can be commissioned very quickly and easily by setting P0010 = 1. After that only the important parameters (e.g.: P0304, P0305, etc.) are visible. The value of these parameters must be entered one after the other. The end of quick commissioning and the start of internal calculation will be done by setting P3900 = 1 - 3. Afterward parameter P0010 and P3900 will be reset to zero automatically.

P0010 = 2
For service purposes only.

P0010 = 29
To transfer a parameter file via PC tool (e.g.: DriveMonitor, STARTER) parameter P0010 will be set to 29 by the PC tool. When download has been finished PC tool resets parameter P0010 to zero.

P0010 = 30
When resetting the parameters of inverter P0010 must be set to 30. Resetting of the parameters will be started by setting parameter P0970 = 1. The inverter will automatically reset all its parameters to their default settings. This can prove beneficial if you experience problems during parameter setup and wish to start again. Duration of factory setting will take about 60 s.

P0011	Lock for user defined parameter			Min: 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: FUNC	**Active:** first confirm	**QuickComm.:** No	**Max:** 65535	

Details:

See parameter P0013 (user defined parameter)

P0012	Key for user defined parameter			Min: 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: FUNC	**Active:** first confirm	**QuickComm.:** No	**Max:** 65535	

Details:

See parameter P0013 (user defined parameter).

P0013[20]	User defined parameter			Min: 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: FUNC	**Active:** first confirm	**QuickComm.:** No	**Max:** 65535	

Defines a limited set of parameters to which the end user will have access.

Instructions for use:

1. Set P0003 = 3 (expert user)
2. Go to P0013 indices 0 to 16 (user list)
3. Enter into P0013 index 0 to 16 the parameters required to be visible in the user-defined list. The following values are fixed and cannot be changed:
   - P0013 index 19 = 12 (key for user defined parameter)
   - P0013 index 18 = 10 (commissioning parameter filter)
   - P0013 index 17 = 3 (user access level)
4. Set P0003 = 0 to activate the user defined parameter.

Index:

P0013[0] : 1st user parameter
P0013[1] : 2nd user parameter
P0013[2] : 3rd user parameter
P0013[3] : 4th user parameter
P0013[4] : 5th user parameter
P0013[5] : 6th user parameter
P0013[6] : 7th user parameter
P0013[7] : 8th user parameter
P0013[8] : 9th user parameter
P0013[9] : 10th user parameter
P0013[10] : 11th user parameter
P0013[11] : 12th user parameter
P0013[12] : 13th user parameter
P0013[13] : 14th user parameter
P0013[14] : 15th user parameter
P0013[15] : 16th user parameter
P0013[16] : 17th user parameter
P0013[17] : 18th user parameter
P0013[18] : 19th user parameter
P0013[19] : 20th user parameter

Dependency:

First, set P0011 ("lock") to a different value than P0012 ("key") to prevent changes to user-defined parameter. Then, set P0003 to 0 to activate the user-defined list.

When locked and the user-defined parameter is activated, the only way to exit the user-defined parameter (and view other parameters) is to set P0012 ("key") to the value in P0011 ("lock").

Note:

- Alternatively, set P0010 = 30 (commissioning parameter filter = factory setting) and P0970 = 1 (factory reset) to perform a complete factory reset.
- The default values of P0011 ("lock") and P0012 ("key") are the same.

P0014[3] Store mode

CStat: UT	**Datatype:** U16	**Unit:** -	**Min:** 0		Level
P-Group: -	**Active:** first confirm	**QuickComm.:** No	**Def:** 0	**Max:** 1	**3**

Sets the store mode for parameters ("volatile" (RAM) or "nonvolatile" (EEPROM)).

Possible Settings:

0 Volatile (RAM)
1 Nonvolatile (EEPROM)

Index:

P0014[0] : Serial interface COM link
P0014[1] : Serial interface BOP link
P0014[2] : PROFIBUS / CB

Note:

1. With the BOP the parameter will always be stored in the EEPROM.
2. P0014 itself will always be stored in the EEPROM.
3. P0014 will not be changed by performing a factory reset (P0010 = 30 and P0971 = 1).
4. P0014 can be transferred during a DOWNLOAD (P0010 = 29).
5. If "Store request via USS/CB = volatile (RAM)" and "P0014[x] = volatile (RAM)", you can make a transfer of all parameter values into the nonvolatile memory via P0971.
6. If "Store request via USS/CB" and P0014[x] are not consistent, the setting of P14[x] = "store nonvolatile (EEPROM)" has always higher priority.

Store request via USS/CB	Value of P0014[x]	Result
EEPROM	RAM	EEPROM
EEPROM	EEPROM	EEPROM
RAM	RAM	RAM
RAM	EEPROM	EEPROM

3.2 Diagnosis parameters

r0018	**Firmware version**			**Min:** -	Level
		Datatype: Float	**Unit:** -	**Def:** -	**1**
	P-Group: INVERTER			**Max:** -	

Displays version number of installed firmware.

r0019	**CO/BO: BOP control word**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: COMMANDS			**Max:** -	

Displays status of operator panel commands.

The settings below are used as the "source" codes for keypad control when connecting to BICO input parameters.

Bitfields:

Bit00	ON/OFF1	0	NO	1	YES
Bit01	OFF2: Electrical stop	0	YES	1	NO
Bit08	JOG right	0	NO	1	YES
Bit11	Reverse (setpoint inversion)	0	NO	1	YES
Bit13	Motor potentiometer MOP up	0	NO	1	YES
Bit14	Motor potentiometer MOP down	0	NO	1	YES

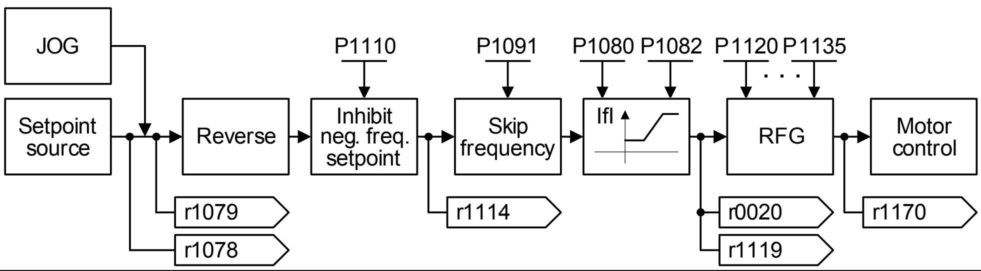
Note:

When BICO technology is used to allocate functions to panel buttons, this parameter displays the actual status of the relevant command.

The following functions can be "connected" to individual buttons:
- ON/OFF1,
- OFF2,
- JOG,
- REVERSE,
- INCREASE,
- DECREASE

r0020	**CO: Freq. setpoint before RFG**			**Min:** -	Level
		Datatype: Float	**Unit:** Hz	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays actual frequency setpoint (input from ramp function generator).



r0021	**CO: Act. filtered frequency 1**			**Min:** -	Level
		Datatype: Float	**Unit:** Hz	**Def:** -	**2**
	P-Group: CONTROL			**Max:** -	

Displays actual inverter output frequency (r0021) excluding slip compensation, resonance damping and frequency limitation.

r0022	**Act. filtered rotor speed**			**Min:** -	Level
		Datatype: Float	**Unit:** 1/min	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays calculated rotor speed based on inverter output frequency [Hz] x 120 / number of poles.

$$r0022[1/min] = r0021[Hz] \cdot \frac{60}{r0313}$$

Note:

This calculation makes no allowance for load-dependent slip.

r0024 **CO: Act. filtered output freq.** **Min:** - Level **3**
Datatype: Float **Unit:** Hz **Def:** -
P-Group: CONTROL **Max:** -

Displays actual output frequency. Slip compensation, resonance damping and frequency limitation are included.

r0025 **CO: Act. filtered output voltage** **Min:** - Level **2**
Datatype: Float **Unit:** V **Def:** -
P-Group: CONTROL **Max:** -

Displays [rms] voltage applied to motor.

r0026 **CO: Act. filtered DC-link volt.** **Min:** - Level **2**
Datatype: Float **Unit:** V **Def:** -
P-Group: INVERTER **Max:** -

Displays DC-link voltage.

		Mains		
		200 - 240 V	380 - 480 V	500 - 600 V
$U_{DC_max_trip}$	F0002	420 V (FS A - C) 410 V (FS D - F)	840 V (FS A - C) 820 V (FS D - F) 820 V (FS FX, GX)	1020 V
$U_{DC_min_trip}$	F0003	215 V	430 V (FS A - F) 380 V (FS FX, GX)	530 V
$U_{DC_max_wam}$ $U_{DC_max_ctrl}$	A0502 (P1240)	r1242		
$U_{DC_min_wam}$ $U_{DC_min_ctrl}$	A0503 (P1240)	$\frac{P1245[\%]}{100} \cdot \sqrt{2} \cdot P0210$		
U_{DC_Comp}	(P1236)	$0.98 \cdot r1242$		
$U_{DC_Chopper}$	(P1237)	$0.98 \cdot r1242$		

r0027 **CO: Act. filtered output current** **Min:** - Level **2**
Datatype: Float **Unit:** A **Def:** -
P-Group: CONTROL **Max:** -

Displays [rms] value of motor current [A].

r0029 **CO: Act. filtered current Isd** **Min:** - Level **3**
Datatype: Float **Unit:** A **Def:** -
P-Group: CONTROL **Max:** -

Displays flux-generating current component.

The flux-generating current component is based on the nominal flux, which is calculated from the motor parameters (P0340 - Calculation of motor parameters).

Dependency:

Applies when vector control is selected in P1300 (control mode); otherwise, the display shows the value zero.

Note:

The flux-generating current component is generally constant up to the base speed of the motor; above base speed, this component is weakened (field weakening) thus enabling an increase in motor speed but at reduced torque.

r0030 **CO: Act. filtered current Isq** **Min:** - Level **3**
Datatype: Float **Unit:** A **Def:** -
P-Group: CONTROL **Max:** -

Displays torque-generating current component.

Note:

For asynchronous motors, a limit is calculated for the torque generating current component (in conjunction with the maximum possible output voltage (r0071), motor leakage and current field weakening (r0377)) and this prevents motor stalling.

r0031	**CO: Act. filtered torque**			**Min:** -	Level
		Datatype: Float	**Unit:** Nm	**Def:** -	**2**
	P-Group: CONTROL			**Max:** -	

Displays electrical torque.

$$m_M = \frac{3}{2} \cdot \frac{L_m}{L_R} \cdot Z_p \cdot \Psi_{rd} \cdot i_{sq}$$

Valid for V/f-caracteristic:

$$i_{sq} \approx \frac{u \cdot |i_s| \cdot \cos\varphi - R_s^2 \cdot |i_s|}{e}$$

m_M : Motor torque
Z_p : Pole pair number
Ψ_{rd} : Rotor flux
L_R : Rotor inductance
L_m : Magnetizing inductance
i_{sq} : Torque-generating current
e : Motor counter EMF

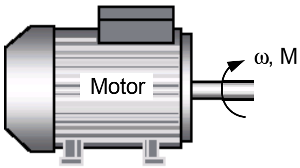
Output value will be zero at low speeds when the current injection is active (r1751.5 = 1).

Note:

The electrical torque is not the same as the mechanical torque, which can be measured on the shaft. Due to windage and friction a part of the electrical torque is lost in the motor.

r0032	**CO: Act. filtered power**			**Min:** -	Level
		Datatype: Float	**Unit:** -	**Def:** -	**2**
	P-Group: CONTROL			**Max:** -	

Displays motor power (power output at the motor shaft).



$$P_{mech} = \omega \cdot M = 2 \cdot \pi \cdot f \cdot M$$

$$\Rightarrow$$

$$r0032[kW] = \frac{1}{1000} \cdot 2 \cdot \pi \cdot \frac{r0022}{60}[1/min] \cdot r0031[Nm]$$

$$r0032[hp] = 0.75 \cdot r0032[kW]$$

Dependency:

Value is displayed in [kW] or [hp] depending on setting for P0100 (operation for Europe / North America).

r0035[3]	**CO: Act. motor temperature**			**Min:** -	Level
		Datatype: Float	**Unit:** °C	**Def:** -	**2**
	P-Group: MOTOR			**Max:** -	

Displays measured motor temperature.

Index:

r0035[0] : 1st. Drive data set (DDS)
r0035[1] : 2nd. Drive data set (DDS)
r0035[2] : 3rd. Drive data set (DDS)

r0036	**CO:Inverter overload utilization**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**4**
	P-Group: INVERTER			**Max:** -	

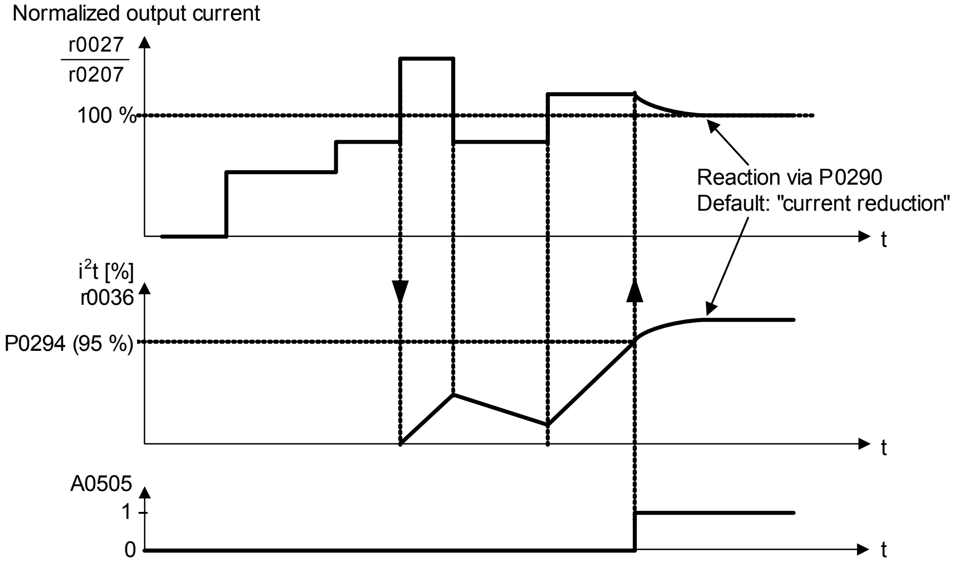
Displays inverter overload utilization calculated via I2t model.

The actual I2t value relative to the max. possible I2t value supplies utilization in [%].

If the current exceeds the threshold for P0294 (inverter I2t overload warning), alarm A0505 (inverter I2t) is generated and the output current of the inverter reduced via P0290 (inverter overload reaction).

If 100 % utilization is exceeded, alarm F0005 (inverter I2t) is tripped.

Example:



Dependency:

r0036 > 0:
If the nominal current of the inverter is exceed, utilization will be displayed. Otherwise, 0 % utilization is displayed.

r0037[5]	**CO: Inverter temperature [°C]**			**Min:** -	Level
		Datatype: Float	**Unit:** °C	**Def:** -	**3**
	P-Group: INVERTER			**Max:** -	

Displays measured heatsink temperature and calculated junction temperature of IGBTs based on thermal model.

Index:

r0037[0] : Measured heat sink temperature
r0037[1] : Chip temperature
r0037[2] : Rectifier temperature
r0037[3] : Inverter ambient temperature
r0037[4] : Control board temperature

r0038	**CO: Act. power factor**			**Min:** -	Level
		Datatype: Float	**Unit:** -	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays actual power factor.

Dependency:

Applies when V/f control is selected in P1300 (control mode); otherwise, the display shows the value 1.

r0039	**CO: Energy consumpt. meter [kWh]**			**Min:** -	Level
		Datatype: Float	**Unit:** kWh	**Def:** -	**2**
	P-Group: INVERTER			**Max:** -	

Displays electrical energy used by inverter since display was last reset (see P0040 - reset energy consumption meter).

$$r0039 = \int_0^{t_{act}} P_W \cdot dt = \int_0^{t_{act}} \sqrt{3} \cdot u \cdot i \cdot \cos\varphi \cdot dt$$

Dependency:

Value is reset when P0040 = 1 (reset energy consumption meter).

P0040	**Reset energy consumption meter**		**Min:** 0	Level
	CStat: CT	**Datatype:** U16 **Unit:** -	**Def:** 0	**2**
	P-Group: INVERTER	**Active:** first confirm **QuickComm.:** No	**Max:** 1	

Resets value of parameter r0039 (energy consumption meter) to zero.

Possible Settings:

0 No reset
1 Reset r0039 to 0

Dependency:

No reset until "P" is pressed.

r0050	**CO: Active command data set**		**Min:** -	Level
		Datatype: U16 **Unit:** -	**Def:** -	**2**
	P-Group: COMMANDS		**Max:** -	

Displays currently selected and active command data set (CDS).

Possible Settings:

0 1st. Command data set (CDS)
1 2nd. Command data set (CDS)
2 3rd. Command data set (CDS)

Details:

See parameter P0810.

r0051[2]	**CO: Active drive data set (DDS)**		**Min:** -	Level
		Datatype: U16 **Unit:** -	**Def:** -	**2**
	P-Group: COMMANDS		**Max:** -	

Displays currently selected and active drive data set (DDS).

Possible Settings:

0 1st. Drive data set (DDS)
1 2nd. Drive data set (DDS)
2 3rd. Drive data set (DDS)

Index:

r0051[0] : Selected drive data set
r0051[1] : Active drive data set

Details:

See parameter P0820.

r0052	CO/BO: Act. status word 1			Min: -	Level
		Datatype: U16	Unit: -	Def: -	2
	P-Group: COMMANDS			Max: -	

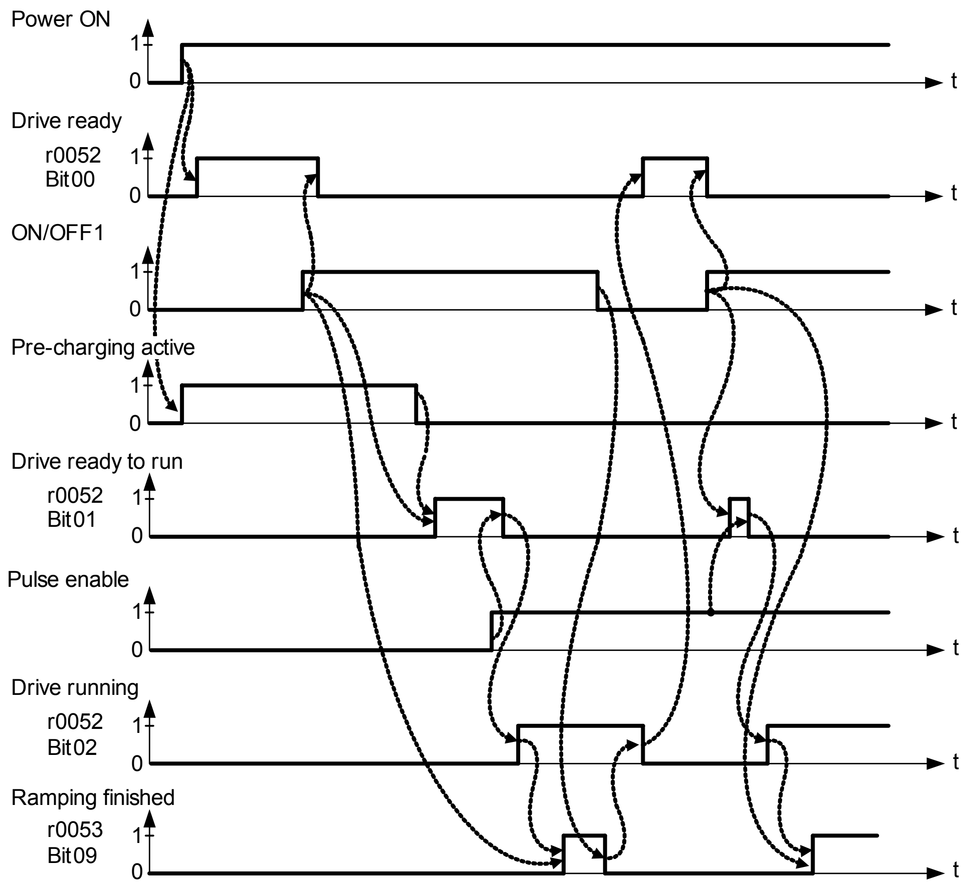
Displays first active status word of inverter (bit format) and can be used to diagnose inverter status.

Bitfields:

Bit00	Drive ready	0 NO	1 YES
Bit01	Drive ready to run	0 NO	1 YES
Bit02	Drive running	0 NO	1 YES
Bit03	Drive fault active	0 NO	1 YES
Bit04	OFF2 active	0 YES	1 NO
Bit05	OFF3 active	0 YES	1 NO
Bit06	ON inhibit active	0 NO	1 YES
Bit07	Drive warning active	0 NO	1 YES
Bit08	Deviation setpoint / act. value	0 YES	1 NO
Bit09	PZD control	0 NO	1 YES
Bit10	Maximum frequency reached	0 NO	1 YES
Bit11	Warning: Motor current limit	0 YES	1 NO
Bit12	Motor holding brake active	0 NO	1 YES
Bit13	Motor overload	0 YES	1 NO
Bit14	Motor runs right	0 NO	1 YES
Bit15	Inverter overload	0 YES	1 NO

Dependency:

r0052 Bit00 - Bit02:
State-sequence diagram after Power On or ON/OFF1 respectively: ==> see below



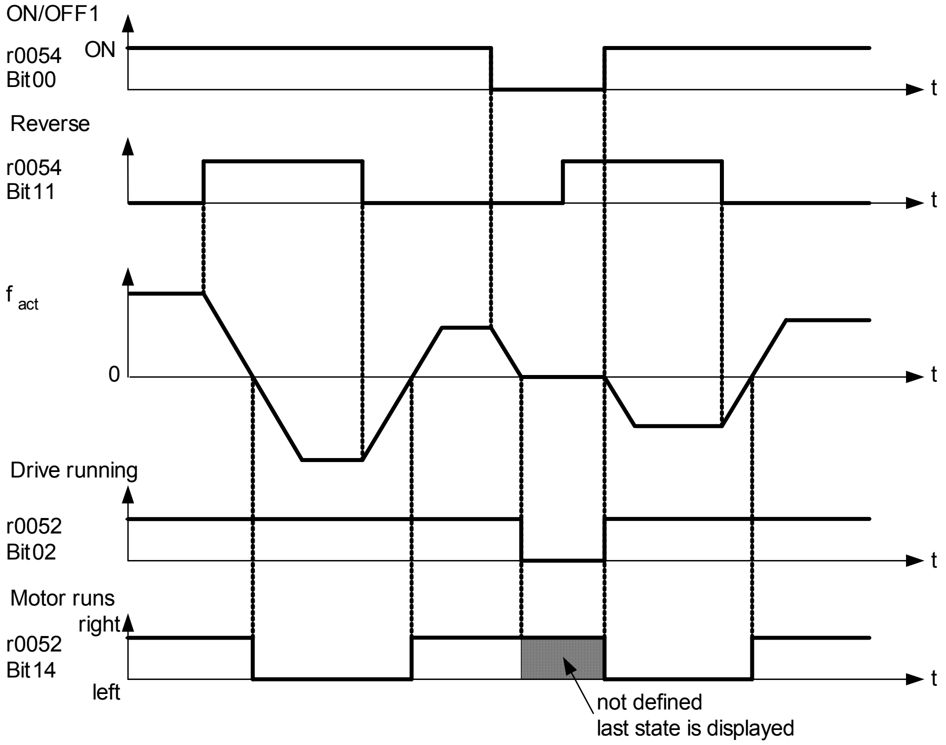
r0052 Bit03 "Drive fault active":
Output of Bit3 (Fault) will be inverted on digital output (Low = Fault, High = No Fault).

r0052 Bit08 "Deviation setpoint / act. value" ==> see parameter P2164

r0052 Bit10 "f_act >= P1082 (f_max)" ==> see parameter P1082

r0052 Bit12 "Motor holding brake active" ==> see parameter P1215

r0052 Bit14 "Motor runs right" ==> see below



Details:

The 7-segment display of the bit-parameters (binary parameters) is explained in the Introduction of the Parameter List.

r0053	**CO/BO: Act. status word 2**		**Min:** -	Level
		Datatype: U16 **Unit:** -	**Def:** -	**2**
	P-Group: COMMANDS		**Max:** -	

Displays second status word of inverter (in bit format).

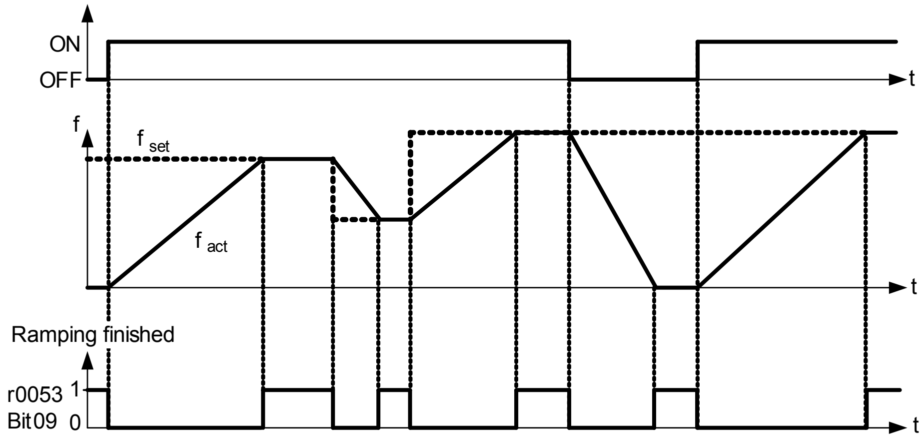
Bitfields:

Bit00	DC brake active	0	NO	1	YES
Bit01	f_act > P2167 (f_off)	0	NO	1	YES
Bit02	f_act <= P1080 (f_min)	0	NO	1	YES
Bit03	Act. current r0027 > P2170	0	NO	1	YES
Bit04	f_act > P2155 (f_1)	0	NO	1	YES
Bit05	f_act <= P2155 (f_1)	0	NO	1	YES
Bit06	f_act >= setpoint	0	NO	1	YES
Bit07	Act. Vdc r0026 < P2172	0	NO	1	YES
Bit08	Act. Vdc r0026 > P2172	0	NO	1	YES
Bit09	Ramping finished	0	NO	1	YES
Bit10	PID output r2294 == P2292 (PID_min)	0	NO	1	YES
Bit11	PID output r2294 == P2291 (PID_max)	0	NO	1	YES
Bit14	Download data set 0 from AOP	0	NO	1	YES
Bit15	Download data set 1 from AOP	0	NO	1	YES

Note:

- r0053 Bit00 ==> see parameter P1233
- r0053 Bit01 ==> see parameter P2167
- r0053 Bit02 ==> see parameter P1080
- r0053 Bit03 ==> see parameter P2170
- r0053 Bit04 ==> see parameter P2155
- r0053 Bit05 ==> see parameter P2155
- r0053 Bit06 ==> see parameter P2150
- r0053 Bit07 ==> see parameter P2172
- r0053 Bit08 ==> see parameter P2172

r0053 Bit09 "Ramping finished" ==> see below



Details:

See description of seven-segment display given in the "Introduction to MICROMASTER System Parameters" in this manual.

r0054	**CO/BO: Act. control word 1**		**Min:** -	Level
		Datatype: U16 **Unit:** -	**Def:** -	**3**
	P-Group: COMMANDS		**Max:** -	

Displays first control word of inverter and can be used to diagnose which commands are active.

Bitfields:

Bit00	ON/OFF1	0 NO	1 YES
Bit01	OFF2: Electrical stop	0 YES	1 NO
Bit02	OFF3: Fast stop	0 YES	1 NO
Bit03	Pulses enabled	0 NO	1 YES
Bit04	RFG enable	0 NO	1 YES
Bit05	RFG start	0 NO	1 YES
Bit06	Setpoint enable	0 NO	1 YES
Bit07	Fault acknowledge	0 NO	1 YES
Bit08	JOG right	0 NO	1 YES
Bit09	JOG left	0 NO	1 YES
Bit10	Control from PLC	0 NO	1 YES
Bit11	Reverse (setpoint inversion)	0 NO	1 YES
Bit13	Motor potentiometer MOP up	0 NO	1 YES
Bit14	Motor potentiometer MOP down	0 NO	1 YES
Bit15	CDS Bit 0 (Local/Remote)	0 NO	1 YES

Details:

See description of seven-segment display given in the "Introduction to MICROMASTER System Parameters" in this manual.

r0055	**CO/BO: Act. control word 2**		**Min:** -	Level
		Datatype: U16 **Unit:** -	**Def:** -	**3**
	P-Group: COMMANDS		**Max:** -	

Displays additional control word of inverter and can be used to diagnose which commands are active.

Bitfields:

Bit00	Fixed frequency Bit 0	0 NO	1 YES
Bit01	Fixed frequency Bit 1	0 NO	1 YES
Bit02	Fixed frequency Bit 2	0 NO	1 YES
Bit03	Fixed frequency Bit 3	0 NO	1 YES
Bit04	Drive data set (DDS) Bit 0	0 NO	1 YES
Bit05	Drive data set (DDS) Bit 1	0 NO	1 YES
Bit08	PID enabled	0 NO	1 YES
Bit09	DC brake enabled	0 NO	1 YES
Bit11	Droop enabled	0 NO	1 YES
Bit12	Torque control	0 NO	1 YES
Bit13	External fault 1	0 YES	1 NO
Bit15	Command data set (CDS) Bit 1	0 NO	1 YES

Details:

See description of seven-segment display given in the "Introduction to MICROMASTER System Parameters" in this handbook.

r0056	**CO/BO: Status of motor control**		**Min:** -	Level
	P-Group: CONTROL	**Datatype:** U16 **Unit:** -	**Def:** - **Max:** -	**3**

Displays status of motor control (MM420: V/f status), which can be used to diagnose inverter status.

Bitfields:

Bit00	Init. control finished	0 NO	1 YES
Bit01	Motor demagnetizing finished	0 NO	1 YES
Bit02	Pulses enabled	0 NO	1 YES
Bit03	Voltage soft start selected	0 NO	1 YES
Bit04	Motor excitation finished	0 NO	1 YES
Bit05	Starting boost active	0 NO	1 YES
Bit06	Acceleration boost active	0 NO	1 YES
Bit07	Frequency is negative	0 NO	1 YES
Bit08	Field weakening active	0 NO	1 YES
Bit09	Volts setpoint limited	0 NO	1 YES
Bit10	Slip frequency limited	0 NO	1 YES
Bit11	F_out > F_max Freq. limited	0 NO	1 YES
Bit12	Phase reversal selected	0 NO	1 YES
Bit13	I-max controller active	0 NO	1 YES
Bit14	Vdc-max controller active	0 NO	1 YES
Bit15	KIB (Vdc-min control) active	0 NO	1 YES

Details:

See description of seven-segment display given in the introduction.

r0061	**CO: Act. encoder frequency**		**Min:** -	Level
	P-Group: CONTROL	**Datatype:** Float **Unit:** Hz	**Def:** - **Max:** -	**2**

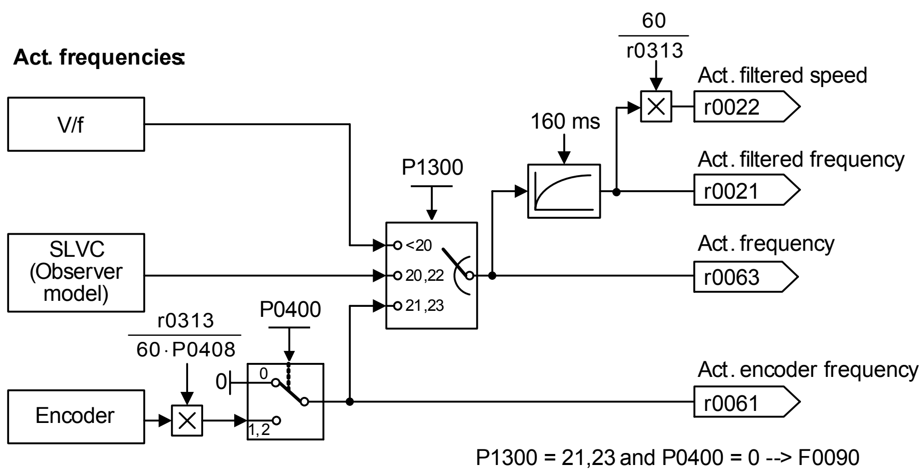
Displays actual frequency detected by encoder.

r0062	**CO: Freq. setpoint**		**Min:** -	Level
	P-Group: CONTROL	**Datatype:** Float **Unit:** Hz	**Def:** - **Max:** -	**3**

Displays frequency setpoint of vector controller.

r0063	**CO: Act. frequency**		**Min:** -	Level
	P-Group: CONTROL	**Datatype:** Float **Unit:** Hz	**Def:** - **Max:** -	**3**

Displays actual unfiltered frequency. This value is not smoothed in contrary to r0021.



r0064 **CO: Dev. frequency controller** Min: - Level **3**
Datatype: Float Unit: Hz Def: -
P-Group: CONTROL Max: -

Displays actual deviation of speed controller.

This value is calculated from the frequency setpoint (r0062) and the actual frequency (r0063).

Dependency:
Applies when vector control is selected in P1300 (control mode); otherwise, the display shows the value zero.

r0065 **CO: Slip frequency** Min: - Level **3**
Datatype: Float Unit: % Def: -
P-Group: CONTROL Max: -

Displays slip frequency of motor in [%] relative to the rated motor frequency (P0310).

Details:
For V/f control, see also P1335 (slip compensation).

r0066 **CO: Act. output frequency** Min: - Level **3**
Datatype: Float Unit: Hz Def: -
P-Group: CONTROL Max: -

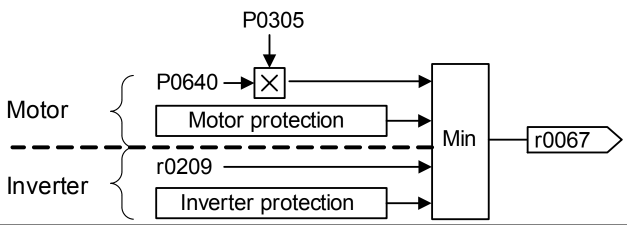
Displays actual output frequency.

Note:
The output frequency is limited by the values entered in P1080 (min. frequency) and P1082 (max. frequency).

r0067 **CO: Act. output current limit** Min: - Level **3**
Datatype: Float Unit: A Def: -
P-Group: CONTROL Max: -

Displays valid maximum output current of inverter.

Parameter r0067 is influenced/determined by the following factors:
- Rated motor current P0305
- Motor overload factor P0640
- Motor protection in dependency of P0610
- r0067 is less than or equal to maximum inverter current r0209
- Inverter protection in dependency of P0290



Note:
A reduction of r0067 may indicate an inverter overload or a motor overload.

r0068 **CO: Output current** Min: - Level **3**
Datatype: Float Unit: A Def: -
P-Group: CONTROL Max: -

Displays unfiltered [rms] value of motor current [A].

Note:
This is used for the process control (contrary to the smoothed output current r0027, that is used for display).

r0069[6] **CO: Act. phase currents** Min: - Level **4**
Datatype: Float Unit: A Def: -
P-Group: CONTROL Max: -

Displays phase currents.

Index:
r0069[0] : U_phase
r0069[1] : V_phase
r0069[2] : W_phase
r0069[3] : Offset U_phase
r0069[4] : Offset V_phase
r0069[5] : Offset W_phase

r0070	**CO: Act. DC-link voltage**	**Datatype:** Float **Unit:** V	**Min:** - **Def:** - **Max:** -	Level **3**
	P-Group: INVERTER			

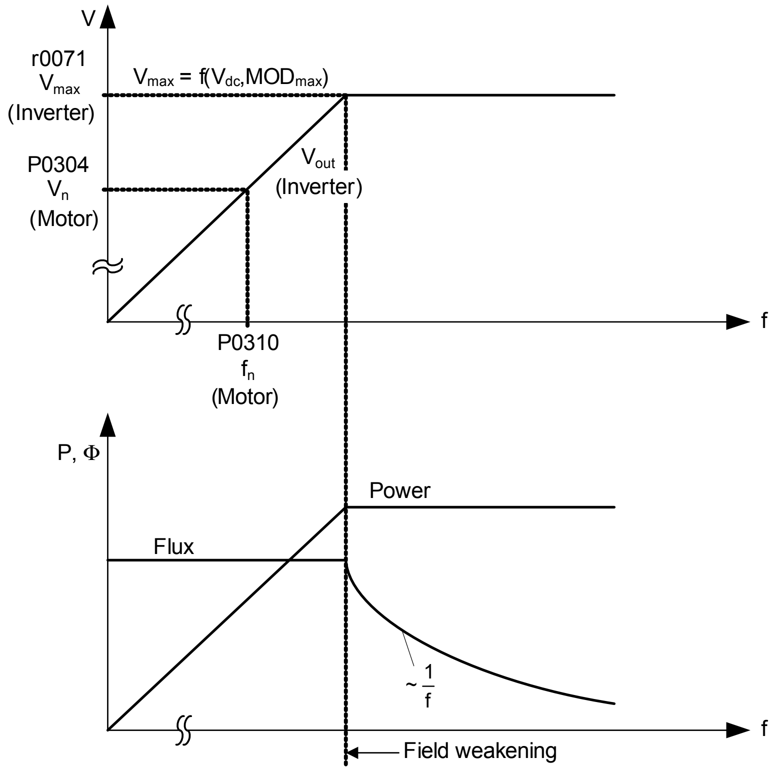
Displays (unfiltered) DC-link voltage.

Note:

Used for process control purposes (in contrast to r0026 (actual DC-link voltage), which is filtered and is used to display the value on the BOP/AOP).

r0071	**CO: Max. output voltage**	**Datatype:** Float **Unit:** V	**Min:** - **Def:** - **Max:** -	Level **3**
	P-Group: CONTROL			

Displays maximum output voltage.



Dependency:

- The actual maximum output voltage depends on the actual incoming line supply voltage.
- The maximum possible output voltage r0071 of the drive inverter is determined by the DC link voltage r0026 and the maximum modulation depth P1803 in the gating unit.
- The maximum output voltage r0071 is tracked with the DC link voltage so that the highest possible value is always and automatically achieved.
- The output voltage only reaches the calculated maximum value under steady-state conditions at the rated load.
- In the no-load and partial load ranges, lower output voltages r0025 are obtained.

r0072	**CO: Act. output voltage**	**Datatype:** Float **Unit:** V	**Min:** - **Def:** - **Max:** -	Level **3**
	P-Group: CONTROL			

Displays output voltage.

r0074	**CO: Act. modulation**	**Datatype:** Float **Unit:** %	**Min:** - **Def:** - **Max:** -	Level **4**
	P-Group: CONTROL			

Displays actual modulation index.

The modulation index is defined as ratio between the magnitude of the fundamental component in the inverter phase output voltage and half of the dc-link voltage.

r0075	**CO: Current setpoint Isd**			**Min:** -	Level
		Datatype: Float	**Unit:** A	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays setpoint of flux generating current component.

Dependency:

Applies when vector control is selected in P1300 (control mode); otherwise, the display shows the value zero.

r0076	**CO: Act. current Isd**			**Min:** -	Level
		Datatype: Float	**Unit:** A	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays flux generating current component.

Dependency:

Applies when vector control is selected in P1300 (control mode); otherwise, the display shows the value zero.

r0077	**CO: Current setpoint Isq**			**Min:** -	Level
		Datatype: Float	**Unit:** A	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays setpoint for component of torque generating current.

Dependency:

Applies when vector control is selected in P1300 (control mode); otherwise, the display shows the value zero.

r0078	**CO: Act. current Isq**			**Min:** -	Level
		Datatype: Float	**Unit:** A	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays component of torque generating current.

r0079	**CO: Torque setpoint (total)**			**Min:** -	Level
		Datatype: Float	**Unit:** Nm	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays total torque setpoint.

Dependency:

Applies when vector control is selected in P1300 (control mode); otherwise, the display shows the value zero.

r0080	**CO: Act. torque**			**Min:** -	Level
		Datatype: Float	**Unit:** Nm	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays actual torque. Output value will be zero at low frequencies when current injection is active (r1751.5 = 1).

r0084	**CO: Act. air gap flux**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays air gap flux in [%] relative to the rated motor flux.

r0086	**CO: Act. active current**			**Min:** -	Level
		Datatype: Float	**Unit:** A	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays active (real part) of motor current.

Dependency:

Applies when V/f control is selected in P1300 (control mode); otherwise, the display shows the value zero.

r0090	**CO: Act. rotor angle**			**Min:** -	Level
		Datatype: Float	**Unit:** °	**Def:** -	**2**
	P-Group: CONTROL			**Max:** -	

Indicates the current angle of the rotor. This function is not available on single input channel encoders.

P0095[10]	CI: Display PZD signals			Min: 0:0	Level 3
	CStat: CT	Datatype: U32	Unit: -	Def: 0:0	
	P-Group: CONTROL	Active: first confirm	QuickComm.: No	Max: 4000:0	

Selects source of display for PZD signals.

Index:

P0095[0] : 1st PZD signal
P0095[1] : 2nd PZD signal
P0095[2] : 3rd PZD signal
P0095[3] : 4th PZD signal
P0095[4] : 5th PZD signal
P0095[5] : 6th PZD signal
P0095[6] : 7th PZD signal
P0095[7] : 8th PZD signal
P0095[8] : 9th PZD signal
P0095[9] : 10th PZD signal

r0096[10]	PZD signals			Min: -	Level 3
		Datatype: Float	Unit: %	Def: -	
	P-Group: CONTROL			Max: -	

Displays PZD signals in [%].

Index:

r0096[0] : 1st PZD signal
r0096[1] : 2nd PZD signal
r0096[2] : 3rd PZD signal
r0096[3] : 4th PZD signal
r0096[4] : 5th PZD signal
r0096[5] : 6th PZD signal
r0096[6] : 7th PZD signal
r0096[7] : 8th PZD signal
r0096[8] : 9th PZD signal
r0096[9] : 10th PZD signal

Note:

r0096 = 100 % corresponds to 4000 hex.

3.3 Inverter parameters (HW)

P0100	**Europe / North America**			**Min:**	0	Level
	CStat: C	**Datatype:** U16	**Unit:** -	**Def:**	0	**1**
	P-Group: QUICK	**Active:** first confirm	**QuickComm.:** Yes	**Max:**	2	

Determines whether power settings (e.g. nominal rating plate power - P0307) are expressed in [kW] or [hp].

The default settings for the nominal rating plate frequency (P0310) and maximum motor frequency (P1082) are also set automatically here, in addition to reference frequency (P2000).

Possible Settings:

0 Europe [kW], frequency default 50 Hz
1 North America [hp], frequency default 60 Hz
2 North America [kW], frequency default 60 Hz

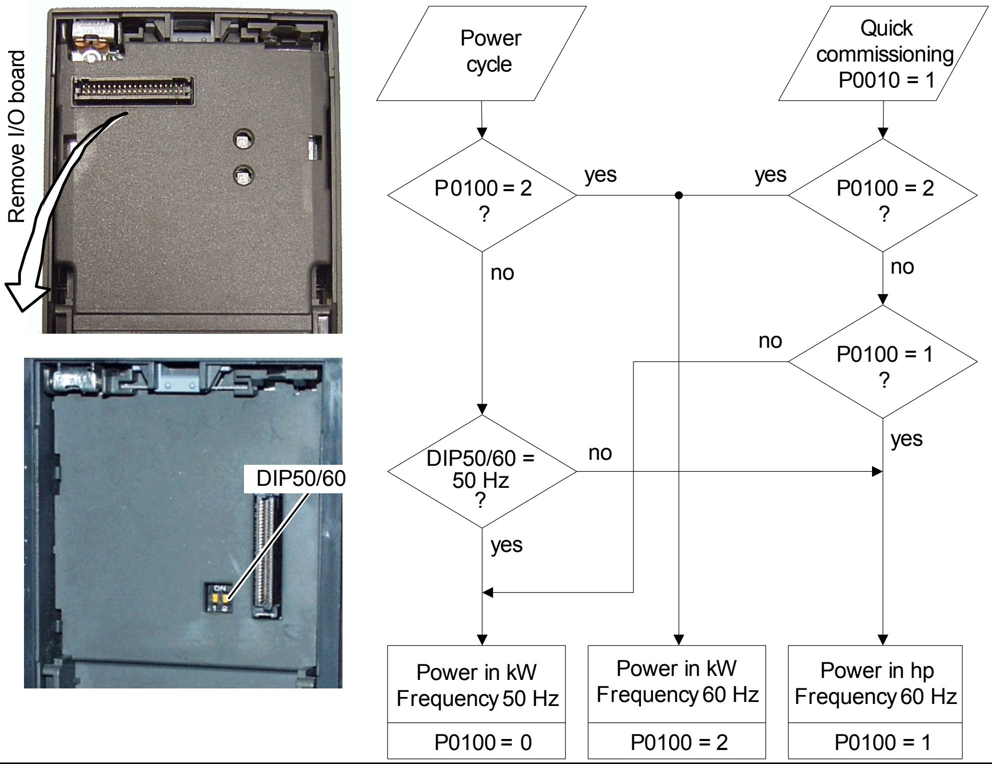
Dependency:

Where:

- Stop drive first (i.e. disable all pulses) before you change this parameter.
- P0100 can only be changed when P0010 = 1 (Commissioning mode) via the respective Commissioing interface (e.g. BOP).
- Changing P0100 resets all rated motor parameters as well as other parameters that depend on the rated motor parameters (see P0340 - calculation of motor parameters).

Changing P0100 overwrites the settings of the DIP50/60 switch (location shown in the diagram below):

1. Parameter P0100 has an higher priority than the DIP50/60 switch.
2. However, after the inverter is powered-on again and P0100 < 2, the DIP50/60 setting will take priority and overwrite P0100.
3. The DIP50/60 switch does not have any effect, if P0100 = 2.



Notice:

P0100 setting 2 (==> [kW], frequency default 60 [Hz]) is not overwritten by the setting of DIP switch 2 (see diagram above).

P0199	**Equipment system number**			**Min:**	0	Level
	CStat: UT	**Datatype:** U16	**Unit:** -	**Def:**	0	**2**
	P-Group: -	**Active:** first confirm	**QuickComm.:** No	**Max:**	255	

Equipment system number This parameter has no operation effect.

r0200 **Act. power stack code number**

Datatype: U32 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: INVERTER

Level **3**

Identifies hardware variant as shown in table below.

Code-No.	MM440 MLFB	Input Voltage & Frequency	CT Power kW	VT Power kW	Internal Filter	Frame Size
41	6SE6440-2UC11-2AAx	1/3AC200-240V +10% -10% 47-63Hz	0,12	0,12	no	A
42	6SE6440-2UC12-5AAx	1/3AC200-240V +10% -10% 47-63Hz	0,25	0,25	no	A
43	6SE6440-2UC13-7AAx	1/3AC200-240V +10% -10% 47-63Hz	0,37	0,37	no	A
44	6SE6440-2UC15-5AAx	1/3AC200-240V +10% -10% 47-63Hz	0,55	0,55	no	A
45	6SE6440-2UC17-5AAx	1/3AC200-240V +10% -10% 47-63Hz	0,75	0,75	no	A
46	6SE6440-2AB11-2AAx	1AC200-240V +10% -10% 47-63Hz	0,12	0,12	Cl. A	A
47	6SE6440-2AB12-5AAx	1AC200-240V +10% -10% 47-63Hz	0,25	0,25	Cl. A	A
48	6SE6440-2AB13-7AAx	1AC200-240V +10% -10% 47-63Hz	0,37	0,37	Cl. A	A
49	6SE6440-2AB15-5AAx	1AC200-240V +10% -10% 47-63Hz	0,55	0,55	Cl. A	A
50	6SE6440-2AB17-5AAx	1AC200-240V +10% -10% 47-63Hz	0,75	0,75	Cl. A	A
51	6SE6440-2UC21-1BAx	1/3AC200-240V +10% -10% 47-63Hz	1,1	1,1	no	B
52	6SE6440-2UC21-5BAx	1/3AC200-240V +10% -10% 47-63Hz	1,5	1,5	no	B
53	6SE6440-2UC22-2BAx	1/3AC200-240V +10% -10% 47-63Hz	2,2	2,2	no	B
54	6SE6440-2AB21-1BAx	1AC200-240V +10% -10% 47-63Hz	1,1	1,1	Cl. A	B
55	6SE6440-2AB21-5BAx	1AC200-240V +10% -10% 47-63Hz	1,5	1,5	Cl. A	B
56	6SE6440-2AB22-2BAx	1AC200-240V +10% -10% 47-63Hz	2,2	2,2	Cl. A	B
57	6SE6440-2UC23-0CAx	1/3AC200-240V +10% -10% 47-63Hz	3	3	no	C
58	6SE6440-2UC24-0CAx	3AC200-240V +10% -10% 47-63Hz	4	5,5	no	C
59	6SE6440-2UC25-5CAx	3AC200-240V +10% -10% 47-63Hz	5,5	7,5	no	C
60	6SE6440-2AB23-0CAx	1AC200-240V +10% -10% 47-63Hz	3	3	Cl. A	C
61	6SE6440-2AC23-0CAx	3AC200-240V +10% -10% 47-63Hz	3	3	Cl. A	C
62	6SE6440-2AC24-0CAx	3AC200-240V +10% -10% 47-63Hz	4	5,5	Cl. A	C
63	6SE6440-2AC25-5CAx	3AC200-240V +10% -10% 47-63Hz	5,5	7,5	Cl. A	C
64	6SE6440-2UC27-5DAx	3AC200-240V +10% -10% 47-63Hz	7,5	11	no	D
65	6SE6440-2UC31-1DAx	3AC200-240V +10% -10% 47-63Hz	11	15	no	D
66	6SE6440-2UC31-5DAx	3AC200-240V +10% -10% 47-63Hz	15	18,5	no	D
67	6SE6440-2AC27-5DAx	3AC200-240V +10% -10% 47-63Hz	7,5	11	Cl. A	D
68	6SE6440-2AC31-1DAx	3AC200-240V +10% -10% 47-63Hz	11	15	Cl. A	D
69	6SE6440-2AC31-5DAx	3AC200-240V +10% -10% 47-63Hz	15	18,5	Cl. A	D
70	6SE6440-2UC31-8EAx	3AC200-240V +10% -10% 47-63Hz	18,5	22	no	E
71	6SE6440-2UC32-2EAx	3AC200-240V +10% -10% 47-63Hz	22	30	no	E
72	6SE6440-2AC31-8EAx	3AC200-240V +10% -10% 47-63Hz	18,5	22	Cl. A	E
73	6SE6440-2AC32-2EAx	3AC200-240V +10% -10% 47-63Hz	22	30	Cl. A	E
74	6SE6440-2UC33-0FAx	3AC200-240V +10% -10% 47-63Hz	30	37	no	F
75	6SE6440-2UC33-7FAx	3AC200-240V +10% -10% 47-63Hz	37	45	no	F
76	6SE6440-2UC34-5FAx	3AC200-240V +10% -10% 47-63Hz	45	45	no	F
77	6SE6440-2AC33-0FAx	3AC200-240V +10% -10% 47-63Hz	30	37	Cl. A	F
78	6SE6440-2AC33-7FAx	3AC200-240V +10% -10% 47-63Hz	37	45	Cl. A	F
79	6SE6440-2AC34-5FAx	3AC200-240V +10% -10% 47-63Hz	45	45	Cl. A	F
80	6SE6440-2UD13-7AAx	3AC380-480V +10% -10% 47-63Hz	0,37	0,37	no	A
81	6SE6440-2UD15-5AAx	3AC380-480V +10% -10% 47-63Hz	0,55	0,55	no	A
82	6SE6440-2UD17-5AAx	3AC380-480V +10% -10% 47-63Hz	0,75	0,75	no	A
83	6SE6440-2UD21-1AAx	3AC380-480V +10% -10% 47-63Hz	1,1	1,1	no	A
84	6SE6440-2UD21-5AAx	3AC380-480V +10% -10% 47-63Hz	1,5	1,5	no	A
85	6SE6440-2UD22-2BAx	3AC380-480V +10% -10% 47-63Hz	2,2	2,2	no	B
86	6SE6440-2UD23-0BAx	3AC380-480V +10% -10% 47-63Hz	3	3	no	B
87	6SE6440-2UD24-0BAx	3AC380-480V +10% -10% 47-63Hz	4	4	no	B
88	6SE6440-2AD22-2BAx	3AC380-480V +10% -10% 47-63Hz	2,2	2,2	Cl. A	B
89	6SE6440-2AD23-0BAx	3AC380-480V +10% -10% 47-63Hz	3	3	Cl. A	B
90	6SE6440-2AD24-0BAx	3AC380-480V +10% -10% 47-63Hz	4	4	Cl. A	B
91	6SE6440-2UD25-5CAx	3AC380-480V +10% -10% 47-63Hz	5,5	7,5	no	C
92	6SE6440-2UD27-5CAx	3AC380-480V +10% -10% 47-63Hz	7,5	11	no	C
93	6SE6440-2UD31-1CAx	3AC380-480V +10% -10% 47-63Hz	11	15	no	C

Code-No.	MM440 MLFB	Input Voltage & Frequency	CT Power kW	VT Power kW	Internal Filter	Frame Size
94	6SE6440-2AD25-5CAx	3AC380-480V +10% -10% 47-63Hz	5,5	7,5	Cl. A	C
95	6SE6440-2AD27-5CAx	3AC380-480V +10% -10% 47-63Hz	7,5	11	Cl. A	C
96	6SE6440-2AD31-1CAx	3AC380-480V +10% -10% 47-63Hz	11	15	Cl. A	C
97	6SE6440-2UD31-5DAx	3AC380-480V +10% -10% 47-63Hz	15	18,5	no	D
98	6SE6440-2UD31-8DAx	3AC380-480V +10% -10% 47-63Hz	18,5	22	no	D
99	6SE6440-2UD32-2DAx	3AC380-480V +10% -10% 47-63Hz	22	30	no	D
100	6SE6440-2AD31-5DAx	3AC380-480V +10% -10% 47-63Hz	15	18,5	Cl. A	D
101	6SE6440-2AD31-8DAx	3AC380-480V +10% -10% 47-63Hz	18,5	22	Cl. A	D
102	6SE6440-2AD32-2DAx	3AC380-480V +10% -10% 47-63Hz	22	30	Cl. A	D
103	6SE6440-2UD33-0EAx	3AC380-480V +10% -10% 47-63Hz	30	37	no	E
104	6SE6440-2UD33-7EAx	3AC380-480V +10% -10% 47-63Hz	37	45	no	E
105	6SE6440-2AD33-0EAx	3AC380-480V +10% -10% 47-63Hz	30	37	Cl. A	E
106	6SE6440-2AD33-7EAx	3AC380-480V +10% -10% 47-63Hz	37	45	Cl. A	E
107	6SE6440-2UD34-5FAx	3AC380-480V +10% -10% 47-63Hz	45	55	no	F
108	6SE6440-2UD35-5FAx	3AC380-480V +10% -10% 47-63Hz	55	75	no	F
109	6SE6440-2UD37-5FAx	3AC380-480V +10% -10% 47-63Hz	75	90	no	F
110	6SE6440-2AD34-5FAx	3AC380-480V +10% -10% 47-63Hz	45	55	Cl. A	F
111	6SE6440-2AD35-5FAx	3AC380-480V +10% -10% 47-63Hz	55	75	Cl. A	F
112	6SE6440-2AD37-5FAx	3AC380-480V +10% -10% 47-63Hz	75	90	Cl. A	F
113	6SE6440-2UE17-5CAx	3AC500-600V +10% -10% 47-63Hz	0,75	1,5	no	C
114	6SE6440-2UE21-5CAx	3AC500-600V +10% -10% 47-63Hz	1,5	2,2	no	C
115	6SE6440-2UE22-2CAx	3AC500-600V +10% -10% 47-63Hz	2,2	4	no	C
116	6SE6440-2UE24-0CAx	3AC500-600V +10% -10% 47-63Hz	4	5,5	no	C
117	6SE6440-2UE25-5CAx	3AC500-600V +10% -10% 47-63Hz	5,5	7,5	no	C
118	6SE6440-2UE27-5CAx	3AC500-600V +10% -10% 47-63Hz	7,5	11	no	C
119	6SE6440-2UE31-1CAx	3AC500-600V +10% -10% 47-63Hz	11	15	no	C
120	6SE6440-2UE31-5DAx	3AC500-600V +10% -10% 47-63Hz	15	18,5	no	D
121	6SE6440-2UE31-8DAx	3AC500-600V +10% -10% 47-63Hz	18,5	22	no	D
122	6SE6440-2UE32-2DAx	3AC500-600V +10% -10% 47-63Hz	22	30	no	D
123	6SE6440-2UE33-0EAx	3AC500-600V +10% -10% 47-63Hz	30	37	no	E
124	6SE6440-2UE33-7EAx	3AC500-600V +10% -10% 47-63Hz	37	45	no	E
125	6SE6440-2UE34-5FAx	3AC500-600V +10% -10% 47-63Hz	45	55	no	F
126	6SE6440-2UE35-5FAx	3AC500-600V +10% -10% 47-63Hz	55	75	no	F
127	6SE6440-2UE37-5FAx	3AC500-600V +10% -10% 47-63Hz	75	90	no	F
1001	6SE6440-2UD38-8FAx	3AC400-480V +10% -10% 47-63Hz	90	110	no	FX
1002	6SE6440-2UD41-1FAx	3AC400-480V +10% -10% 47-63Hz	110	132	no	FX
1003	6SE6440-2UD41-3GAx	3AC400-480V +10% -10% 47-63Hz	132	160	no	GX
1004	6SE6440-2UD41-6GAx	3AC400-480V +10% -10% 47-63Hz	160	200	no	GX
1005	6SE6440-2UD42-0GAx	3AC400-480V +10% -10% 47-63Hz	200	250	no	GX

Notice:

Parameter r0200 = 0 indicates that no power stack has been identified.

P0201 Power stack code number

CStat: C **Datatype:** U16 **Unit:** - **Min:** 0 Level **3**
P-Group: INVERTER **Active:** first confirm **QuickComm.:** No **Def:** 0 **Max:** 65535

Confirms actual power stack identified.

r0203 Act. inverter type

Datatype: U16 **Unit:** - **Min:** - Level **3**
P-Group: INVERTER **Def:** - **Max:** -

Type number of actual inverter identified.

Possible Settings:

1 MICROMASTER 420
2 MICROMASTER 440
3 MICRO- / COMBIMASTER 411
4 MICROMASTER 410
5 Reserved
6 MICROMASTER 440 PX
7 MICROMASTER 430

r0204	**Power stack features**			**Min:** -	Level
		Datatype: U32	**Unit:** -	**Def:** -	**3**
	P-Group: INVERTER			**Max:** -	

Displays hardware features of power stack.

Bitfields:

Bit00	DC input voltage	0 NO	1 YES
Bit01	RFI filter	0 NO	1 YES

Note:

Parameter r0204 = 0 indicates that no power stack has been identified.

P0205	**Inverter application**			**Min:** 0	Level
	CStat: C	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: INVERTER	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 1	

Selects inverter application.

The inverter and motor requirements are determined by the speed range and torque requirements of the load. The relationship between speed and torque for different loads (constant torque loads or variable torque loads).

Possible Settings:

0 Constant torque
1 Variable torque

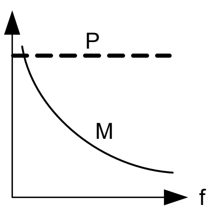
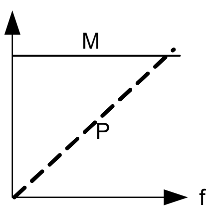
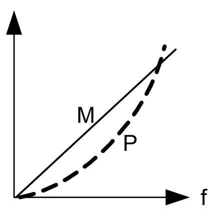
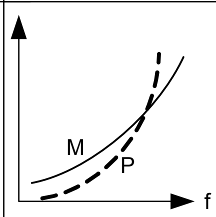
Note:

Constant torque (CT):
CT is used if the application needs a constant torque on the whole frequency range. Many loads can be considered to be constant torque loads. Typical constant torque loads are conveyors, compressors and positve displacement pumps (see diagram).

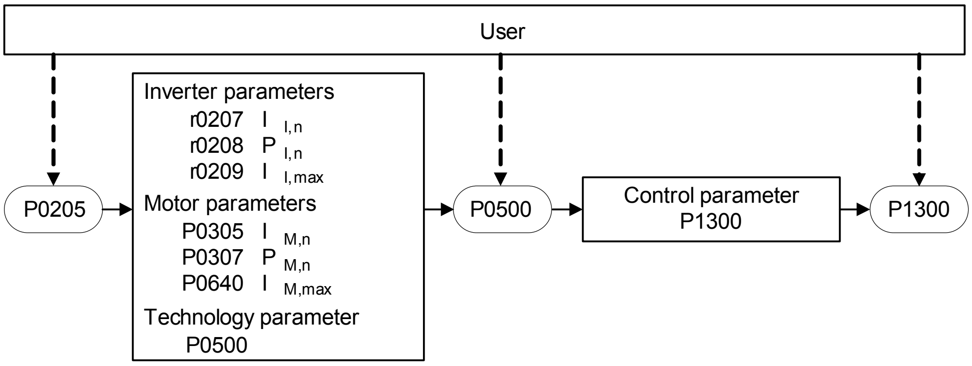
Variable torque (VT):
VT is used if the application has a parabolic frequency-torque characteristic like many fans and pumps.

Variable torque allows with the same inverter:
- Higher rated inverter current r0207
- Higher rated inverter power r0206
- Higher threshold for I2t protection

If P0205 is modified in quick commissioning it immediately calculates various motor parameters:
- P0305 Rated motor current
- P0307 Rated motor power
- P0640 Motor overload factor

Torque	$M \sim \frac{1}{f}$	$M = const.$	$M \sim f$	$M \sim f^2$
Power	$P = const.$	$P \sim f$	$P \sim f^2$	$P \sim f^3$
Characteristic				
Application	Winders Facing lathes Rotary cutting machines	Hoisting gear Belt conveyors Process machines Involving forming Rolling mills Planers Compressors	Calenders with viscous friction Eddy-current brakes	Pumps Fans Centrifuges

It is recommended to modify P0205 first. Afterwards motor parameter may be adapted. Motor parameter will be overridden by changing this sequence.



Notice:

- The parameter value is not reset by the factory setting (see P0970).
- To set P0205 = 1 (variable torque) is not possible for all inverters.
- Use setting 1 (variable torque) only for variable-torque applications (e.g. pumps and fans). If used for constant-load applications, I2t warning will be produced too late, causing overheating in the motor.

---

r0206 **Rated inverter power [kW] / [hp]**

Datatype: Float **Unit:** - **Min:** - **Def:** - **Max:** - Level **2**

P-Group: INVERTER

Displays nominal rated motor power from inverter.

Dependency:

Value is displayed in [kW] or [hp] depending on setting for P0100 (operation for Europe / North America).

$$r0206[hp] = 0.75 \cdot r0206[kW]$$

---

r0207[3] **Rated inverter current**

Datatype: Float **Unit:** A **Min:** - **Def:** - **Max:** - Level **2**

P-Group: INVERTER

Indicates the rated inverter current.

Index:

r0207[0] : Rated inverter current
r0207[1] : Rated VT current
r0207[2] : Rated CT current

Note:

VT (variable torque) and CT (constant torque) specify the overload capability (CT/VT application) of the inverter. The definition of the rated as well as the overload and base load values depend on the inverter type and inverter power. The different values can be taken from the appropriate Catalog or are saved in the drive inverter (refer to Fig.).

The VT rated current r0207[1] or CT rated current r0207[2] represent the matching 4-pole Siemens IEC standard motor for the selected load duty cycle (refer to the diagram). Parameters r0207[1] or r0207[2] are used as default values for P0305 as a function of the CT/VT application (load duty cycle). If r0207[1] = r0207[2], then it is not possible to make a differentiation between a CT/VT application.

Overload in operation is only possible if, before the overload condition, the load current was less than the rated current. For drives, which must be able to handle overload conditions, it is first necessary to define a base load current for the required load.

If the full overload capability is used, then this is detected using an I^2t monitoring and the power module is protected as a function of parameter P0290.

---

r0208 **Rated inverter voltage**

Datatype: U32 **Unit:** V **Min:** - **Def:** - **Max:** - Level **2**

P-Group: INVERTER

Displays nominal AC supply voltage of inverter.

Value:

r0208 = 230 : 200 - 240 V +/- 10 %
r0208 = 400 : 380 - 480 V +/- 10 %
r0208 = 575 : 500 - 600 V +/- 10 %

r0209	**Maximum inverter current**		**Min:** -	Level
		Datatype: Float	**Unit:** A	**Def:** -	**2**
	P-Group: INVERTER			**Max:** -	

Displays maximum output current of inverter.

Dependency:

Parameter r0209 depends on the derating which is affected by pulse frequency P1800, ambient temperature and altitude. The data of deration is given in the OPERATING INSRTRUCTION.

P0210	**Supply voltage**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** V	**Def:** 230	**3**
	P-Group: INVERTER	**Active:** Immediately	**QuickComm.:** No	**Max:** 1000	

Parameter P0210 defines the supply voltage.

Its default value depends upon the type of inverter. If P0210 does not correspond to the supply voltage, then it must be modified.

When P0210 has been modified, the following thresholds are changed:

Dependency:

Optimizes Vdc controller, which extends the ramp-down time if regenerative energy from motor would otherwise cause DC link overvoltage trips.

Reducing the value enables controller to cut in earlier and reduce the risk of overvoltage.

Set P1254 ("Auto detect Vdc switch-on levels") = 0. Cut-in levels for Vdc-controller and compound braking are then derived directly from P0210 (supply voltage).

Vdc_min switch-on level	$= P1245 \cdot \sqrt{2} \cdot P0210$
Vdc_max switch-on level	$= 1.15 \cdot \sqrt{2} \cdot P0210$
Compound braking switch-on level	$= 1.13 \cdot \sqrt{2} \cdot P0210$
Dynamic braking switch-on level	$= 1.13 \cdot \sqrt{2} \cdot P0210$

Note:

- If mains voltage is higher than value entered, automatic deactivation of the Vdc controller may occur to avoid acceleration of the motor. An alarm will be issued in this case (A0910).
- Default value is depending on inverter type and its rating data.

r0231[2]	**Max. cable length**			**Min:** -	Level
		Datatype: U16	**Unit:** m	**Def:** -	**3**
	P-Group: INVERTER			**Max:** -	

Indexed parameter to display maximum allowable cable length between inverter and motor.

Index:

r0231[0] : Max. allowed unscreened cable length
r0231[1] : Max. allowed screened cable length

Notice:

For full EMC compliance, the screened cable must not exceed 25 m in length when an EMC filter is fitted.

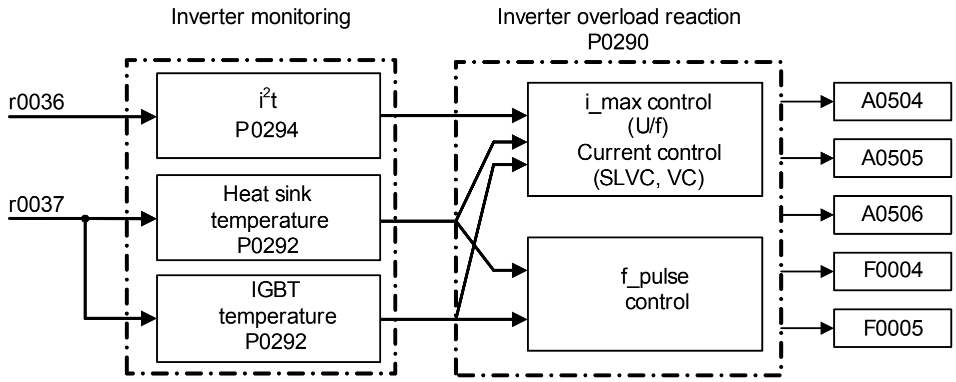
P0290 **Inverter overload reaction**

						Level
CStat: CT	**Datatype:** U16	**Unit:** -	**Min:**	0		**3**
P-Group: INVERTER	**Active:** first confirm	**QuickComm.:** No	**Def:**	2		
			Max:	3		

Selects reaction of inverter to an internal over-temperature.

Following physical values influence the inverter overload protection (see diagram):

- heat sink temperature
- junction temperature (IGBT temperature)
- inverter I²t



Possible Settings:

0 Reduce output frequency
1 Trip (F0004)
2 Reduce pulse frequency and output frequency
3 Reduce pulse frequency then trip (F0004)

Notice:

P0290 = 0:
Reduction of output frequency is only effective if the load is also reduced. This is for example valid for variable torque applications with a quadratic torque characteristic as pumps or fans.

A trip will always result, if the action taken does not sufficiently reduce internal temperature.

The pulse frequency P1800 is reduced only if higher than 2 kHz. The actual pulse frequency is displayed in parameter r1801.

P0291[3] **Inverter protection**

						Level
CStat: CT	**Datatype:** U16	**Unit:** -	**Min:**	0		**4**
P-Group: INVERTER	**Active:** Immediately	**QuickComm.:** No	**Def:**	1		
			Max:	7		

Bit 02 shows if phase loss dedection (input phase) of 3 phase inverters is enabled after factory reset. Default setting of phase loss is disabled for FSA - FSC. FSD and greater it is enabled.

Bitfields:

Bit00	Reserved	0 NO	1 YES
Bit01	Reserved	0 NO	1 YES
Bit02	Phase loss detection enable	0 NO	1 YES

Index:

P0291[0] : 1st. Drive data set (DDS)
P0291[1] : 2nd. Drive data set (DDS)
P0291[2] : 3rd. Drive data set (DDS)

Details:

See P0290 (inverter overload reaction)

P0292	**Inverter temperature warning**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** °C	**Def:** 5	**3**
	P-Group: INVERTER	**Active:** first confirm	**QuickComm.:** No	**Max:** 25	

Defines the temperature difference (in ºC) between the Overtemperature trip threshold and the warning threshold of the inverter. The trip threshold is stored internally by the inverter and cannot be changed by the user.

Temperature warning threshold of inverter T_warn

$T_{warn} = T_{trip}$ - P0292

Temperature shutdown threshold of inverter T_trip

Temperature	**MM440, Frame Size**							
	A - C	**D - F**	**F**	**FX**		**GX**		
			600 V	**95 kW CT**	**110 kW CT**	**132 kW CT**	**160 kW CT**	**200 kW CT**
Heat sink	110 °C	95 °C	80 °C	88 °C	91 °C	80 °C	82 °C	88 °C
IGBT	140 °C	145 °C	145 °C	150 °C	150 °C	145 °C	147 °C	150 °C
Input rectifier	-	-	-	75 °C	75 °C	75 °C	75 °C	75 °C
Cooling air	-	-	-	55 °C	55 °C	55 °C	55 °C	50 °C
Control board	-	-	-	65 °C	65 °C	65 °C	65 °C	65 °C

If the actual inverter temperature (r0037) exceeds the corresponding threshold, a warning A0504, if the temperature still increases then a fault F0004 will be displayed.

P0294	**Inverter I2t overload warning**			**Min:** 10.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 95.0	**4**
	P-Group: INVERTER	**Active:** first confirm	**QuickComm.:** No	**Max:** 100.0	

Defines the [%] value at which alarm A0505 (inverter I2t) is generated.

Inverter I2t calculation is used to determine a maximum tolerable period for inverter overload. The I2t calculation value is deemed = 100 % when this maximum tolerable period is reached.

Dependency:

That the output current of the inverter has been reduced and that the value of I2t does not exceed 100%.

Note:

P0294 = 100 % corresponds to stationary nominal load.

P0295	**Inverter fan off delay time**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** s	**Def:** 0	**3**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 3600	

Defines inverter fan switch off delay time in seconds after drive has stopped.

Note:

Setting to 0, inverter fan will switch off when the drive stops, that is no delay.

3.4 Motor parameters

P0300[3]	**Select motor type**			**Min:** 1	Level
	CStat: C	**Datatype:** U16	**Unit:** -	**Def:** 1	**2**
	P-Group: MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 2	

Selects motor type.

This parameter is required during commissioning to select motor type and optimize inverter performance. Most motors are asynchronous; if in doubt, use the formula below.

$$x = P0310 \cdot \frac{60}{P0311}$$

x = 1, 2, ..., n : Synchronous motor

$x \neq$ 1, 2, ..., n : Asynchronous motor

If the result is a whole number, the motor is synchronous.

Possible Settings:

1 Asynchronous rotational motor
2 Synchronous rotational motor

Index:

P0300[0] : 1st. Drive data set (DDS)
P0300[1] : 2nd. Drive data set (DDS)
P0300[2] : 3rd. Drive data set (DDS)

Dependency:

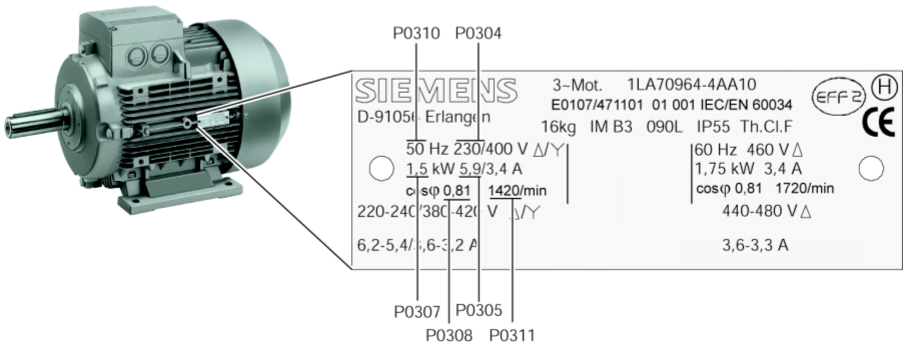
Changeable only when P0010 = 1 (quick commissioning).

If synchronous motor is selected, the following functions are not available:

- P0308 Power factor
- P0309 Motor efficiency
- P0346 Magnetization time
- P0347 Demagnetization time
- P1335 Slip compensation
- P1336 Slip limit
- P0320 Motor magnetizing current
- P0330 Rated motor slip
- P0331 Rated magnetization current
- P0332 Rated power factor
- P0384 Rotor time constant
- P1200, P1202, P1203 Flying start
- P1230, P1232, P1233 DC braking

P0304[3]	**Rated motor voltage**			**Min:**	10	Level
	CStat: C	**Datatype:** U16	**Unit:** V	**Def:**	230	**1**
	P-Group: MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Max:**	2000	

Nominal motor voltage [V] from rating plate. Following diagram shows a typical rating plate with the locations of the relevant motor data.



Line supply voltage	1 AC 110 V *)	1 AC 230 V	3 AC 230 V	3 AC 400 V	3 AC 500 V
MICROMASTER 410	X	X	-	-	-
MICROMASTER 411	-	-	-	X	-
MICROMASTER 420	-	X	X	X	-
MICROMASTER 430	-	-	-	X	-
MICROMASTER 440	-	X	X	X	X

*) Line supply voltage 1-ph. 110 V AC is stepped-up --> frequency inverter output voltage 3-ph. 230 V AC

Index:

P0304[0] : 1st. Drive data set (DDS)
P0304[1] : 2nd. Drive data set (DDS)
P0304[2] : 3rd. Drive data set (DDS)

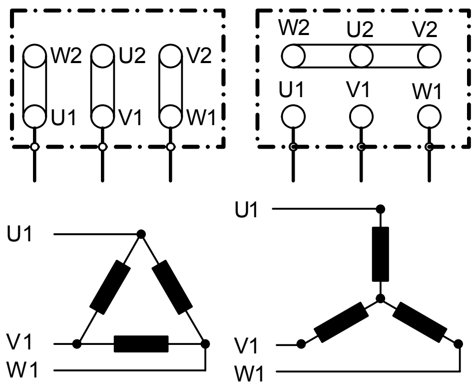
Dependency:

- Changeable only when P0010 = 1 (quick commissioning).
- Default value is depending on inverter type and its rating data.

Caution:

The input of rating plate data must correspond with the wiring of the motor (star / delta). This means, if delta wiring is used for the motor, delta rating plate data has to be entered.

IEC Motor



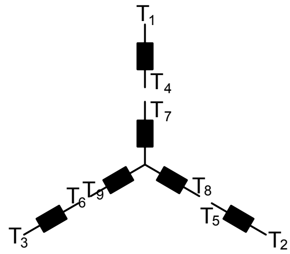
Delta connection Star connection

e.g.: Volts 230 V (Delta connection) / 400 V (Star connection)

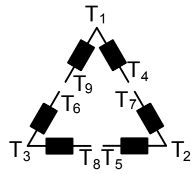
NEMA Motor

Volts	U	V	W	Connected together			Connection
low	T_1-T_7	T_2-T_8	T_3-T_9	T_4-T_5-T_6			Y Y
high	T_1	T_2	T_3	T_1-T_7	T_2-T_8	T_3-T_9	Y

e.g.: Volts 230 V YY (low) / 460 V Y (high)



Volts	U	V	W	Connected together			Connection
low	T_1-T_6-T_7	T_2-T_4-T_8	T_3-T_5-T_9	-			Δ Δ
high	T_1	T_2	T_3	T_4-T_7	T_5-T_8	T_6-T_9	Δ



P0305[3] Rated motor current

						Level
CStat: C		**Datatype:** Float	**Unit:** A	**Min:**	0.01	**1**
P-Group: MOTOR		**Active:** first confirm	**QuickComm.:** Yes	**Def:**	3.25	
				Max:	10000.00	

Nominal motor current [A] from rating plate - see diagram in P0304.

Index:

P0305[0] : 1st. Drive data set (DDS)
P0305[1] : 2nd. Drive data set (DDS)
P0305[2] : 3rd. Drive data set (DDS)

Dependency:

- Changeable only when P0010 = 1 (quick commissioning).
- Default value is depending on inverter type and its rating data.

- Depends also on P0320 (motor magnetization current).

Note:

The maximum value of P0305 depends on the maximum inverter current r0209 and the motor type:

Asynchronous motor : $P0305_{max,asyn} = r0209$

Synchronous motor : $P0305_{max,syn} = 2 \cdot r0209$

It is recommanded that the ratio of P0305 (rated motor current) and r0207 (rated inverter current) should not be lower than:

$$\text{U/f :} \quad \frac{1}{8} \leq \frac{P0305}{r0207}$$

$$\text{SLVC and VC :} \quad \frac{1}{4} \leq \frac{P0305}{r0207}$$

P0307[3] Rated motor power

						Level
CStat: C		**Datatype:** Float	**Unit:** -	**Min:**	0.01	**1**
P-Group: MOTOR		**Active:** first confirm	**QuickComm.:** Yes	**Def:**	0.12	
				Max:	2000.00	

Nominal motor power [kW/hp] from rating plate.

Index:

P0307[0] : 1st. Drive data set (DDS)
P0307[1] : 2nd. Drive data set (DDS)
P0307[2] : 3rd. Drive data set (DDS)

Dependency:

- If P0100 = 1, values will be in [hp] - see diagram P0304 (rating plate).
- Changeable only when P0010 = 1 (quick commissioning).
- Default value is depending on inverter type and its rating data.

P0308[3]	**Rated motor cosPhi**			**Min:** 0.000	Level
	CStat: C	**Datatype:** Float	**Unit:** -	**Def:** 0.000	**1**
	P-Group: MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 1.000	

Nominal motor power factor (cosPhi) from rating plate - see diagram P0304.

Index:

P0308[0] : 1st. Drive data set (DDS)
P0308[1] : 2nd. Drive data set (DDS)
P0308[2] : 3rd. Drive data set (DDS)

Dependency:

- Changeable only when P0010 = 1 (quick commissioning).
- Visible only when P0100 = 0 or 2, (motor power entered in [kW]).
- Default value is depending on inverter type and its rating data.

- Setting 0 causes internal calculation of value. Calculated value see r0332.

P0309[3]	**Rated motor efficiency**			**Min:** 0.0	Level
	CStat: C	**Datatype:** Float	**Unit:** %	**Def:** 0.0	**1**
	P-Group: MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 99.9	

Nominal motor efficiency in [%] from rating plate.

Index:

P0309[0] : 1st. Drive data set (DDS)
P0309[1] : 2nd. Drive data set (DDS)
P0309[2] : 3rd. Drive data set (DDS)

Dependency:

- Changeable only when P0010 = 1 (quick commissioning).
- Visible only when P0100 = 1, (i.e. motor power entered in [hp]).
- Default value is depending on inverter type and its rating data.

- Setting 0 causes internal calculation of value. Calculated value see r0332.

Note:

P0309 = 100 % corresponds to superconducting.

Details:

See diagram in P0304 (rating plate).

P0310[3]	**Rated motor frequency**			**Min:** 12.00	Level
	CStat: C	**Datatype:** Float	**Unit:** Hz	**Def:** 50.00	**1**
	P-Group: MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 650.00	

Nominal motor frequency [Hz] from rating plate.

Index:

P0310[0] : 1st. Drive data set (DDS)
P0310[1] : 2nd. Drive data set (DDS)
P0310[2] : 3rd. Drive data set (DDS)

Dependency:

- Changeable only when P0010 = 1 (quick commissioning).
- Pole pair number recalculated automatically if parameter is changed.

Details:

See diagram in P0304 (rating plate)

P0311[3]	**Rated motor speed**			**Min:** 0	Level
	CStat: C	**Datatype:** U16	**Unit:** 1/min	**Def:** 0	**1**
	P-Group: MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 40000	

Nominal motor speed [rpm] from rating plate.

Index:

P0311[0] : 1st. Drive data set (DDS)
P0311[1] : 2nd. Drive data set (DDS)
P0311[2] : 3rd. Drive data set (DDS)

Dependency:

- Changeable only when P0010 = 1 (quick commissioning).
- Setting 0 causes internal calculation of value.
- Slip compensation in V/f control requires rated motor speed for correct operation.
- Pole pair number recalculated automatically if parameter is changed.
- Default value is depending on inverter type and its rating data.

- Required for vector control and V/f control with speed controller.

Details:

See diagram in P0304 (rating plate)

r0313[3] Motor pole pairs

	Datatype: U16	Unit: -	Min: -	Level
P-Group: MOTOR			Def: -	**3**
			Max: -	

Displays number of motor pole pairs that the inverter is currently using for internal calculations.

Index:

r0313[0] : 1st. Drive data set (DDS)
r0313[1] : 2nd. Drive data set (DDS)
r0313[2] : 3rd. Drive data set (DDS)

Value:

r0313 = 1 : 2-pole motor
r0313 = 2 : 4-pole motor
etc.

Dependency:

Recalculated automatically when P0310 (rated motor frequency) or P0311 (rated motor speed) is changed.

$$r0313 = 60 \cdot \frac{P0310}{P0311}$$

P0314[3] Motor pole pair number

CStat: C	Datatype: U16	Unit: -	Min: 0	Level
P-Group: MOTOR	Active: first confirm	QuickComm.: Yes	Def: 0	**3**
			Max: 99	

Specifies number of pole pairs of motor.

Index:

P0314[0] : 1st. Drive data set (DDS)
P0314[1] : 2nd. Drive data set (DDS)
P0314[2] : 3rd. Drive data set (DDS)

Value:

P0314 = 1 : 2-pole motor
P0314 = 2 : 4-pole motor
etc.

Dependency:

Recalculated automatically when P0310 (rated motor frequency) or P0311 (rated motor speed) is changed.

P0320[3] Motor magnetizing current

CStat: CT	Datatype: Float	Unit: %	Min: 0.0	Level
P-Group: MOTOR	Active: Immediately	QuickComm.: Yes	Def: 0.0	**3**
			Max: 99.0	

Defines motor magnetization current in [%] relative to P0305 (rated motor current).

Index:

P0320[0] : 1st. Drive data set (DDS)
P0320[1] : 2nd. Drive data set (DDS)
P0320[2] : 3rd. Drive data set (DDS)

Dependency:

Setting P0320 = 0: causes calculation by
- P0340 = 1 (data entered from rating plate) or by
- P3900 = 1 - 3 (end of quick commissioning). The calculated value is displayed in parameter r0331.

r0330[3] Rated motor slip

	Datatype: Float	Unit: %	Min: -	Level
P-Group: MOTOR			Def: -	**3**
			Max: -	

Displays nominal motor slip in [%] relative to P0310 (rated motor frequency) and P0311 (rated motor speed).

$$r0330[\%] = \frac{P0310 - \frac{P0311}{60} \cdot r0313}{P0310} \cdot 100\%$$

Index:

r0330[0] : 1st. Drive data set (DDS)
r0330[1] : 2nd. Drive data set (DDS)
r0330[2] : 3rd. Drive data set (DDS)

r0331[3] Rated magnetization current

	Datatype: Float	Unit: A	Min: -	Level
P-Group: MOTOR			Def: -	**3**
			Max: -	

Displays calculated magnetizing current of motor in [A].

Index:

r0331[0] : 1st. Drive data set (DDS)
r0331[1] : 2nd. Drive data set (DDS)
r0331[2] : 3rd. Drive data set (DDS)

r0332[3]	**Rated power factor**			Min: -	Level
		Datatype: Float	Unit: -	Def: -	**3**
	P-Group: MOTOR			Max: -	

Displays power factor for motor

Index:

r0332[0] : 1st. Drive data set (DDS)
r0332[1] : 2nd. Drive data set (DDS)
r0332[2] : 3rd. Drive data set (DDS)

Dependency:

Value is calculated internally if P0308 (rated motor cosPhi) set to 0; otherwise, value entered in P0308 is displayed.

r0333[3]	**Rated motor torque**			Min: -	Level
		Datatype: Float	Unit: Nm	Def: -	**3**
	P-Group: MOTOR			Max: -	

Displays rated motor torque.

Index:

r0333[0] : 1st. Drive data set (DDS)
r0333[1] : 2nd. Drive data set (DDS)
r0333[2] : 3rd. Drive data set (DDS)

Dependency:

Value is calculated from P0307 (rated motor power) and P0311 (rated motor speed).

$$r0333[Nm] = \frac{P0307[kW] \cdot 1000}{\frac{P0311[1/min]}{60} \cdot 2\pi}$$

P0335[3]	**Motor cooling**			Min: 0	Level
	CStat: CT	Datatype: U16	Unit: -	Def: 0	**2**
	P-Group: MOTOR	Active: first confirm	QuickComm.: Yes	Max: 3	

Selects motor cooling system used.

Possible Settings:

0 Self-cooled: Using shaft mounted fan attached to motor
1 Force-cooled: Using separately powered cooling fan
2 Self-cooled and internal fan
3 Force-cooled and internal fan

Index:

P0335[0] : 1st. Drive data set (DDS)
P0335[1] : 2nd. Drive data set (DDS)
P0335[2] : 3rd. Drive data set (DDS)

Caution:

The following combination of parameter setting should not be combined:

- P0610 = 1 and P0335 = 0 or 2 :
  When P0335 = 0 or 2 the inverter cools the motor using a shaft mounted fan. If this is used in conjunction with P0610 the cooling of the motor will be inefficient.

In essence, if the i2t calculation reduces the output frequency, then the shaft mounted fan will also reduce its cooling effect, the motor will then eventually overheat and trip.

- Exception:
  Applications with variable torque the reduction of max. current leeds automatically to a reduction of the load / output current.

Notice:

Motors of series 1LA1 and 1LA8 have an internal fan. This internal motor fan must not be confused with the fan at the end of the motor shaft.

P0340[3] Calculation of motor parameters

CStat: CT	**Datatype:** U16	**Unit:** -	**Min:** 0		Level
P-Group: MOTOR	**Active:** first confirm	**QuickComm.:** No	**Def:** 0	**Max:** 4	**2**

Calculates various motor parameters (see table below). This parameter is required during commissioning to optimize inverter performance.

Possible Settings:

0 No calculation
1 Complete parameterization
2 Calculation of equivalent circuit data
3 Calculation of V/f and vector control data
4 Calculation of controller settings only

Index:

P0340[0] : 1st. Drive data set (DDS)
P0340[1] : 2nd. Drive data set (DDS)
P0340[2] : 3rd. Drive data set (DDS)

Note:

P0340 = 0:
No calculation

P0340 = 1:
The motor weight/moment of inertia (P0344, P0341) are determined starting from the rating plate parameters (P0300 - P0335), the motor equivalent circuit diagram parameters (ESB, P0350 - P0369). The V/f control/vector control parameters and reference quantities are then pre-assigned (includes all of the calculations from P0340 = 2,3,4).

P0340 = 2:
The motor equivalent circuit diagram parameters (ESB, P0350 - P0369) are calculated starting from the rating plate parameters (without any other pre-assignments made).

P0340 = 3:
The V/f control/vector control parameters are determined (includes all calculations from P0340 = 4) starting from the motor equivalent circuit diagram parameters (ESB, P0350 - P0369) and motor weight/moment of inertia, moment of inertia ratio (P0344, P0341, P0342).

P0340 = 4:
The vector control parameters are pre-assigned starting from the motor equivalent circuit diagram parameters (ESB, P0350 - P0369) and motor weight/moment of inertia, moment of inertia ratio (P0344, P0341, P0342).

	P0340 = 1	P0340 = 2	P0340 = 3	P0340 = 4
P0341[3] Motor inertia [kg*m^2]	x			
P0342[3] Total/motor inertia ratio	x			
P0344[3] Motor weight	x			
P0346[3] Magnetization time	x		x	
P0347[3] Demagnetization time	x		x	
P0350[3] Stator resistance (line-to-line)	x	x		
P0352[3] Cable resistance	x	x		
P0354[3] Rotor resistance	x	x		
P0356[3] Stator leakage inductance	x	x		
P0358[3] Rotor leakage inductance	x	x		
P0360[3] Main inductance	x	x		
P0362[3] Magnetizing curve flux 1	x	x		
P0363[3] Magnetizing curve flux 2	x	x		
P0364[3] Magnetizing curve flux 3	x	x		
P0365[3] Magnetizing curve flux 4	x	x		
P0366[3] Magnetizing curve imag 1	x	x		
P0367[3] Magnetizing curve imag 2	x	x		
P0368[3] Magnetizing curve imag 3	x	x		
P0369[3] Magnetizing curve imag 4	x	x		
P0625[3] Ambient motor temperature	x	x		
P1253[3] Vdc-controller output limitation	x		x	
P1316[3] Boost end frequency	x		x	
P1460[3] Gain speed controller	x		x	x
P1462[3] Integral time speed controller	x		x	x
P1470[3] Gain speed controller (SLVC)	x		x	x
P1472[3] Integral time n-ctrl. (SLVC)	x		x	x
P1520[3] CO: Upper torque limit	x			
P1521[3] CO: Lower torque limit	x			
P1530[3] Motoring power limitation	x			
P1531[3] Regenerative power limitation	x			
P1715[3] Gain current controller	x		x	x
P1717[3] Integral time current controller	x		x	x
P1764[3] Kp of n-adaption (SLVC)	x		x	x
P1767[3] Tn of n-adaption (SLVC)	x		x	x
P2000[3] Reference frequency	x			
P2002[3] Reference current	x			
P2003[3] Reference torque	x			
P2174[3] Torque threshold M_thresh	x			
P2185[3] Upper torque threshold 1	x			
P2186[3] Lower torque threshold 1	x			
P2187[3] Upper torque threshold 2	x			
P2188[3] Lower torque threshold 2	x			
P2189[3] Upper torque threshold 3	x			
P2190[3] Lower torque threshold 3	x			

P0341[3]	**Motor inertia [kg*m^2]**			**Min:** 0.00010	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 0.00180	**3**
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 1000.00000	

Sets no-load inertia of motor.

Together with P0342 (inertia ratio total/motor) and P1496 (scaling factor acceleration), this value produces the acceleration torque (r1517), which can be added to any additional torque produced from a BICO source (P1511), and incorporated in the torque control function.

Index:

P0341[0] : 1st. Drive data set (DDS)
P0341[1] : 2nd. Drive data set (DDS)
P0341[2] : 3rd. Drive data set (DDS)

Note:

The result of P0341 * P0342 is included in the speed controller calculation. P0341 * P0342 (inertia ratio total/motor) = total motor inertia

P1496 (scaling factor acceleration) = 100 % activates acceleration pre-control for the speed controller and calculates the torque from P0341 (motor inertia) and P0342 (inertia ratio total/motor).

P0342[3]	**Total/motor inertia ratio**			**Min:** 1.000	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 1.000	**3**
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 400.000	

Specifies ratio between total inertia (load + motor) and motor inertia.

Index:

P0342[0] : 1st. Drive data set (DDS)
P0342[1] : 2nd. Drive data set (DDS)
P0342[2] : 3rd. Drive data set (DDS)

P0344[3]	**Motor weight**			**Min:** 1.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** kg	**Def:** 9.4	**3**
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 6500.0	

Specifies motor weight [kg].

Index:

P0344[0] : 1st. Drive data set (DDS)
P0344[1] : 2nd. Drive data set (DDS)
P0344[2] : 3rd. Drive data set (DDS)

Note:

- This value is used in the motor thermal model.
- It is normally calculated automatically from P0340 (motor parameters) but can also be entered manually.
- Default value is depending on inverter type and its rating data.

r0345[3]	**Motor start-up time**			**Min:** -	Level
		Datatype: Float	**Unit:** s	**Def:** -	**3**
	P-Group: MOTOR			**Max:** -	

Displays motor start-up time. This time corresponds to the standardized motor inertia.

The start-up time is the time taken to reach rated motor speed from standstill at acceleration with rated motor torque (r0333).

Index:

r0345[0] : 1st. Drive data set (DDS)
r0345[1] : 2nd. Drive data set (DDS)
r0345[2] : 3rd. Drive data set (DDS)

P0346[3]	**Magnetization time**			**Min:** 0.000	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 1.000	**3**
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 20.000	

Sets magnetization time [s], i.e. waiting time between pulse enable and start of ramp-up. Motor magnetization builds up during this time.

Magnetization time is normally calculated automatically from the motor data and corresponds to the rotor time constant (r0384).

Index:

P0346[0] : 1st. Drive data set (DDS)
P0346[1] : 2nd. Drive data set (DDS)
P0346[2] : 3rd. Drive data set (DDS)

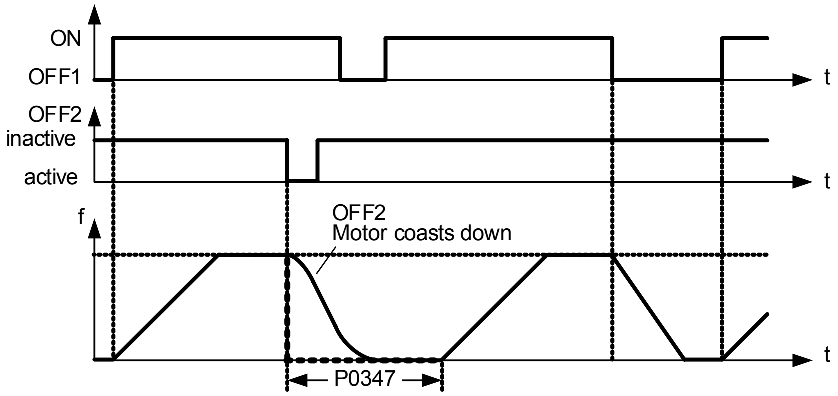
Note:

- If boost settings are higher than 100 %, magnetization time may be reduced.
- Default value is depending on inverter type and its rating data.
- An excessive reduction of this time can result in insufficient motor magnetization.

P0347[3]	**Demagnetization time**			**Min:** 0.000	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 1.000	**3**
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 20.000	

Defines the de-magnetization time for the connected induction motor.

The de-magnetization time is the time that must expire between powering-down the drive (OFF2 or a drive inverter fault/error) and powering-up again. The drive inverter is prevented from being powered-up again within this time interval. The flux in the induction motor is reduced to a low value during this de-magnetization time.



Index:

P0347[0] : 1st. Drive data set (DDS)
P0347[1] : 2nd. Drive data set (DDS)
P0347[2] : 3rd. Drive data set (DDS)

Note:

- The de-magnetization time is approximately 250% of the rotor time constant (r0384) in seconds.
- The pre-assignment (default value) depends on the drive inverter type and its rated/nominal values.
- It is not active after a normal ramp-down - i.e. after OFF1 or OFF3.
- If this time is excessively shortened, then the drive inverter will be tripped (shut down) due to an overcurrent condition.
- If a synchronous motor is connected, the de-magnetization time should be set to 0.

P0350[3]	**Stator resistance (line-to-line)**			**Min:** 0.00001	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Ohm	**Def:** 4.00000	**2**
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 2000.00000	

Stator resistance value in [Ohms] for connected motor (from line-to-line). The parameter value includes the cable resistance.

$$P0350 = 2 \cdot (R_{Cable} + R_S)$$

There are three ways to determine the value for this parameter:

1. Calculate using
   - P0340 = 1 (data entered from rating plate) or
   - P0010 = 1, P3900 = 1,2 or 3 (end of quick commissioning).
2. Measure using P1910 = 1 (motor data identification - value for stator resistance is overwritten).
3. Measure manually using an Ohmmeter.

Index:

P0350[0] : 1st. Drive data set (DDS)
P0350[1] : 2nd. Drive data set (DDS)
P0350[2] : 3rd. Drive data set (DDS)

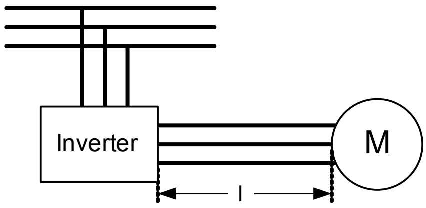
Note:

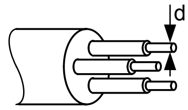
- Since measured line-to-line, this value may appear to be higher (up to 2 times higher) than expected.
- The value entered in P0350 (stator resistance) is the one obtained by the method last used.
- Default value is depending on inverter type and its rating data.

P0352[3] Cable resistance

CStat: CUT	**Datatype:** Float	**Unit:** Ohm	**Min:** 0.0	**Def:** 0.0	Level **3**
P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 120.0		

Describes cable resistance between inverter and motor for one phase.





l : Cable length

d : Cable diameter

$R = \rho \cdot \frac{l}{A}$

A : Cable cross-section $A = \pi \cdot \left(\frac{d}{2}\right)^2$

ρ : Specific resistance $\rho_{Cu} = 0{,}0178 \frac{\Omega \cdot mm^2}{m}$

Index:
P0352[0] : 1st. Drive data set (DDS)
P0352[1] : 2nd. Drive data set (DDS)
P0352[2] : 3rd. Drive data set (DDS)

P0354[3] Rotor resistance

CStat: CUT	**Datatype:** Float	**Unit:** Ohm	**Min:** 0.0	**Def:** 10.0	Level **4**
P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 300.0		

Sets rotor resistance of motor equivalent circuit (phase value).

Index:
P0354[0] : 1st. Drive data set (DDS)
P0354[1] : 2nd. Drive data set (DDS)
P0354[2] : 3rd. Drive data set (DDS)

Dependency:
Calculated automatically using the motor model or determined using P1910 (motor identification).

P0356[3] Stator leakage inductance

CStat: CUT	**Datatype:** Float	**Unit:** -	**Min:** 0.00001	**Def:** 10.00000	Level **4**
P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 1000.00000		

Sets stator leakage inductance [mH] of motor equivalent circuit (phase value).

Stator leakage reactance:

$$X_{\sigma S} = \omega \cdot L_{\sigma S} = 2 \cdot \pi \cdot f \cdot L_{\sigma S} = 2 \cdot \pi \cdot P0310 \cdot \frac{P0356}{1000}$$

Index:
P0356[0] : 1st. Drive data set (DDS)
P0356[1] : 2nd. Drive data set (DDS)
P0356[2] : 3rd. Drive data set (DDS)

Dependency:
Calculated automatically using the motor model or determined using P1910 (motor identification).

P0358[3] Rotor leakage inductance

CStat: CUT	**Datatype:** Float	**Unit:** -	**Min:** 0.0	**Def:** 10.0	Level **4**
P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 1000.0		

Sets rotor leakage inductance [mH] of motor equivalent circuit (phase value).

Rotor leakage reactance:

$$X_{\sigma R} = \omega \cdot L_{\sigma R} = 2 \cdot \pi \cdot f \cdot L_{\sigma R} = 2 \cdot \pi \cdot P0310 \cdot \frac{P0358}{1000}$$

Index:
P0358[0] : 1st. Drive data set (DDS)
P0358[1] : 2nd. Drive data set (DDS)
P0358[2] : 3rd. Drive data set (DDS)

Dependency:
Calculated automatically using the motor model or determined using P1910 (motor identification).

P0360[3]	**Main inductance**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 10.0	**4**
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 3000.0	

Sets main inductance [mH] of the motor equivalent circuit (phase value), see diagram below.

Main reactance:

$$X_m = \omega \cdot L_m = 2 \cdot \pi \cdot f \cdot L_m = 2 \cdot \pi \cdot P0310 \cdot \frac{P0360}{1000}$$

Index:

P0360[0] : 1st. Drive data set (DDS)
P0360[1] : 2nd. Drive data set (DDS)
P0360[2] : 3rd. Drive data set (DDS)

Dependency:

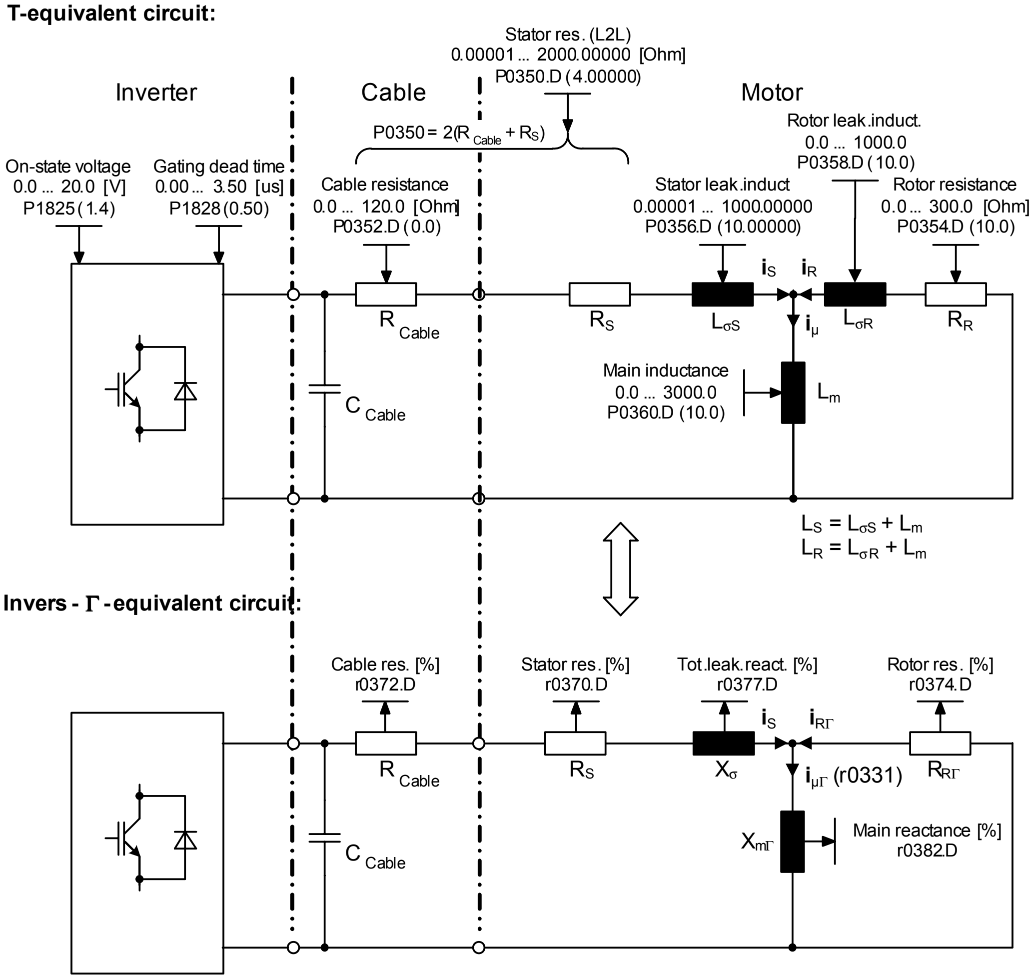
Calculated automatically using the motor model or determined using P1910 (motor identification).

Caution:

The data of equivalent circuit relates to the star equivalent circuit. Any data of the delta equivalent circuit available, therefore must be transformed to the star equivalent circuit before entering into the inverter.

Note:

T-equivalent circuit:



Conversion: T-equivalent curcuit --> Invers - Γ - equivalent circuit

$$k_{\sigma R} = 1 + \frac{L_{\sigma R}}{L_m}$$

$$L_{m\Gamma} = \frac{L_m}{k_{\sigma R}}$$

$$R_{R\Gamma} = \frac{R_R}{k_{\sigma R}^2}$$

$$L_\sigma = L_{\sigma S} + \frac{L_{\sigma R}}{k_{\sigma R}}$$

Conversion: Invers - Γ - equivalent circuit --> T-equivalent curcuit

$$k_{\sigma\Gamma} = 1 + (1 - k_\sigma) \cdot \frac{L_\sigma}{L_{m\Gamma}} = 1 + 0.5 \cdot \frac{L_\sigma}{L_{m\Gamma}}$$

$$R_R = R_{R\Gamma} \cdot k_{\sigma\Gamma}^2$$

$$L_{\sigma S} = k_\sigma \cdot L_\sigma = 0.5 \cdot L_\sigma$$

$$L_{\sigma R} = (1 - k_\sigma) \cdot L_\sigma \cdot k_{\sigma\Gamma} = 0.5 \cdot L_\sigma \cdot k_{\sigma\Gamma}$$

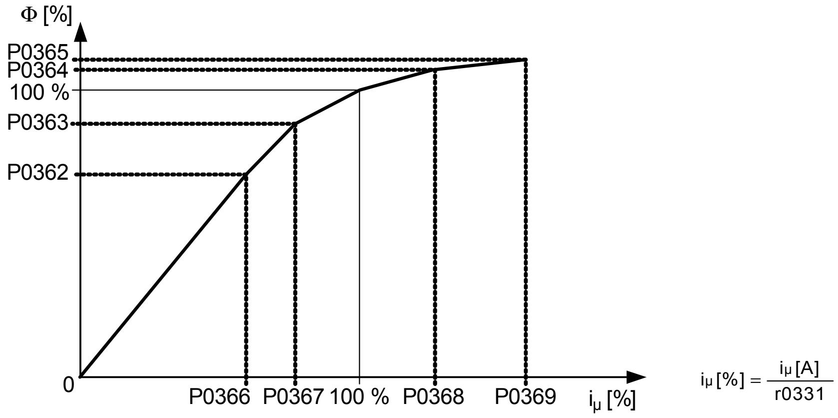
Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \quad \text{<=>} 100\,\%$$

P0362[3]	**Magnetizing curve flux 1**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 60.0	**4**
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 300.0	

Specifies first flux value of saturation characteristic in [%] relative to rated motor voltage (P0304).

The parameter settings for the values of P0362 to P0365 respectively P0366 to P0369 are illustrated in the diagram below.



Index:

P0362[0] : 1st. Drive data set (DDS)
P0362[1] : 2nd. Drive data set (DDS)
P0362[2] : 3rd. Drive data set (DDS)

Note:

- P0362 = 100 % corresponds to rated motor flux
- Rated flux = rated EMF
- The value belongs to the first magnetizing current value and must be smaller than or equal to magnetizing curve flux 2 (P0363).
- If the magnetization values entered in P0362 to P0365 respectively P0366 to P0369 do not match the conditions (see below), a linear characteristic is applied internally.

P0365 ≥ P0364 ≥ P0363 ≥ P0362
P0369 ≥ P0368 ≥ P0367 ≥ P0366

P0363[3]	**Magnetizing curve flux 2**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 85.0	**4**
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 300.0	

Specifies second flux value of saturation characteristic in [%] relative to rated motor voltage (P0304).

Index:

P0363[0] : 1st. Drive data set (DDS)
P0363[1] : 2nd. Drive data set (DDS)
P0363[2] : 3rd. Drive data set (DDS)

Details:

See P0362 (magnetizing curve flux 1).

P0364[3]	Magnetizing curve flux 3				Min:	0.0	Level
	CStat:	CUT	Datatype: Float	Unit: %	Def:	115.0	4
	P-Group:	MOTOR	Active: Immediately	QuickComm.: No	Max:	300.0	

Specifies third flux value of saturation characteristic in [%] relative to rated motor voltage (P0304).

Index:

P0364[0] : 1st. Drive data set (DDS)
P0364[1] : 2nd. Drive data set (DDS)
P0364[2] : 3rd. Drive data set (DDS)

Details:

See P0362 (magnetizing curve flux 1).

P0365[3]	Magnetizing curve flux 4				Min:	0.0	Level
	CStat:	CUT	Datatype: Float	Unit: %	Def:	125.0	4
	P-Group:	MOTOR	Active: Immediately	QuickComm.: No	Max:	300.0	

Specifies fourth flux value of saturation characteristic in [%] relative to rated motor voltage (P0304).

Index:

P0365[0] : 1st. Drive data set (DDS)
P0365[1] : 2nd. Drive data set (DDS)
P0365[2] : 3rd. Drive data set (DDS)

Details:

See P0362 (magnetizing curve flux 1).

P0366[3]	Magnetizing curve imag 1				Min:	0.0	Level
	CStat:	CUT	Datatype: Float	Unit: %	Def:	50.0	4
	P-Group:	MOTOR	Active: Immediately	QuickComm.: No	Max:	500.0	

Specifies first magnetizing current value of the saturation characteristic in [%] relative to the rated magnetizing current (P0331).

Index:

P0366[0] : 1st. Drive data set (DDS)
P0366[1] : 2nd. Drive data set (DDS)
P0366[2] : 3rd. Drive data set (DDS)

Dependency:

Affects P0320 (motor magnetizing current).

Details:

See P0362 (magnetizing curve flux 1).

P0367[3]	Magnetizing curve imag 2				Min:	0.0	Level
	CStat:	CUT	Datatype: Float	Unit: %	Def:	75.0	4
	P-Group:	MOTOR	Active: Immediately	QuickComm.: No	Max:	500.0	

Specifies second magnetizing current value of saturation characteristic in [%] relative to rated magnetizing current (P0331).

Index:

P0367[0] : 1st. Drive data set (DDS)
P0367[1] : 2nd. Drive data set (DDS)
P0367[2] : 3rd. Drive data set (DDS)

Dependency:

Affects P0320 (motor magnetizing current).

Details:

See P0362 (magnetizing curve flux 1).

P0368[3]	Magnetizing curve imag 3				Min:	0.0	Level
	CStat:	CUT	Datatype: Float	Unit: %	Def:	135.0	4
	P-Group:	MOTOR	Active: Immediately	QuickComm.: No	Max:	500.0	

Specifies third magnetizing current value of saturation characteristic in [%] relative to rated magnetizing current (P0331).

Index:

P0368[0] : 1st. Drive data set (DDS)
P0368[1] : 2nd. Drive data set (DDS)
P0368[2] : 3rd. Drive data set (DDS)

Dependency:

Affects P0320 (motor magnetizing current).

Details:

See P0362 (magnetizing curve flux 1).

P0369[3] Magnetizing curve imag 4

CStat: CUT	**Datatype:** Float	**Unit:** %	**Min:** 0.0		Level
P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Def:** 170.0	**Max:** 500.0	**4**

Specifies fourth magnetizing current value of saturation characteristic in [%] relative to rated magnetizing current (P0331).

Index:

P0369[0] : 1st. Drive data set (DDS)
P0369[1] : 2nd. Drive data set (DDS)
P0369[2] : 3rd. Drive data set (DDS)

Dependency:

Affects P0320 (motor magnetizing current).

Details:

See P0362 (magnetizing curve flux 1).

r0370[3] Stator resistance [%]

	Datatype: Float	**Unit:** %	**Min:** - **Def:** -	Level
P-Group: MOTOR			**Max:** -	**4**

Displays standardized stator resistance of motor equivalent circuit (phase value) in [%] of the temperature value in P0625.

Index:

r0370[0] : 1st. Drive data set (DDS)
r0370[1] : 2nd. Drive data set (DDS)
r0370[2] : 3rd. Drive data set (DDS)

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \quad <=> 100\,\%$$

r0372[3] Cable resistance [%]

	Datatype: Float	**Unit:** %	**Min:** - **Def:** -	Level
P-Group: MOTOR			**Max:** -	**4**

Displays standardized cable resistance of motor equivalent circuit (phase value)in [%]. It is estimated to be 20 % of the stator resistance.

Index:

r0372[0] : 1st. Drive data set (DDS)
r0372[1] : 2nd. Drive data set (DDS)
r0372[2] : 3rd. Drive data set (DDS)

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \quad <=> 100\,\%$$

r0373[3] Rated stator resistance [%]

	Datatype: Float	**Unit:** %	**Min:** - **Def:** -	Level
P-Group: MOTOR			**Max:** -	**4**

Displays the nominal stator resistance of the motor equivalent circuit diagram (phase value) as a [%] at the ambient temperature + temperature rise of the stator winding.

Index:

r0373[0] : 1st. Drive data set (DDS)
r0373[1] : 2nd. Drive data set (DDS)
r0373[2] : 3rd. Drive data set (DDS)

Note:

- ambient temperature, refer to P0625
- temperature rise of the stator winding, refer to P0627

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \quad <=> 100\,\%$$

r0374[3]	**Rotor resistance [%]**		Min: -	Level
		Datatype: Float **Unit:** %	**Def:** -	**4**
	P-Group: MOTOR		**Max:** -	

Displays the rotor resistance of the motor equivalent circuit diagram (phase value) as a [%] at the ambient temperature (in the cold state).

$$r0374 = \frac{R_{R\Gamma}}{Z_N} \cdot 100\% = \frac{R_R}{k_{\sigma R}^2 \cdot Z_N} \cdot 100\% = \frac{P0354 \cdot P0360^2}{Z_N (1 + P0358)^2} \cdot 100\%$$

Index:

r0374[0] : 1st. Drive data set (DDS)
r0374[1] : 2nd. Drive data set (DDS)
r0374[2] : 3rd. Drive data set (DDS)

Note:

Ambient temperature, refer to P0625

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \quad \text{<=>} 100\%$$

r0376[3]	**Rated rotor resistance [%]**		Min: -	Level
		Datatype: Float **Unit:** %	**Def:** -	**4**
	P-Group: MOTOR		**Max:** -	

Displays the nominal rotor resistance of the motor equivalent circuit diagram (phase value) as a [%] at the ambient temperature + temperature rise of the rotor winding.

Index:

r0376[0] : 1st. Drive data set (DDS)
r0376[1] : 2nd. Drive data set (DDS)
r0376[2] : 3rd. Drive data set (DDS)

Note:

- ambient temperature, refer to P0625
- temperature rise of the rotor winding, refer to P0628

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \quad \text{<=>} 100\%$$

r0377[3]	**Total leakage reactance [%]**		Min: -	Level
		Datatype: Float **Unit:** %	**Def:** -	**4**
	P-Group: MOTOR		**Max:** -	

Displays standardized total leakage reactance of the motor equivalent circuit (phase value) in [%].

$$r0377 = \frac{L_\sigma}{Z_N} \cdot 100\% = \frac{L_{\sigma S} + \frac{L_{\sigma R}}{k_{\sigma R}}}{Z_N} \cdot 100\% = \frac{P0356 + \frac{P0358 \cdot P0360}{P0358 + P0360}}{Z_N} \cdot 100\%$$

Index:

r0377[0] : 1st. Drive data set (DDS)
r0377[1] : 2nd. Drive data set (DDS)
r0377[2] : 3rd. Drive data set (DDS)

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \quad \text{<=>} 100\%$$

r0382[3]	**Main reactance [%]**		Min: -	Level
		Datatype: Float **Unit:** %	**Def:** -	**4**
	P-Group: MOTOR		**Max:** -	

Displays standardized main reactance of the motor equivalent circuit (phase value) in [%].

$$r0382 = \frac{L_{m\Gamma}}{Z_N} \cdot 100\% = \frac{L_m}{k_{\sigma R} \cdot Z_N} \cdot 100\% = \frac{P0360^2}{Z_N (P0360 + P0358)} \cdot 100\%$$

Index:

r0382[0] : 1st. Drive data set (DDS)
r0382[1] : 2nd. Drive data set (DDS)
r0382[2] : 3rd. Drive data set (DDS)

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \quad \text{<=>} 100\%$$

r0384[3]	**Rotor time constant**			**Min:** -	Level
		Datatype: Float	**Unit:** ms	**Def:** -	**3**
	P-Group: MOTOR			**Max:** -	

Displays calculated rotor time constant [ms].

Index:

r0384[0] : 1st. Drive data set (DDS)
r0384[1] : 2nd. Drive data set (DDS)
r0384[2] : 3rd. Drive data set (DDS)

r0386[3]	**Total leakage time constant**			**Min:** -	Level
		Datatype: Float	**Unit:** ms	**Def:** -	**4**
	P-Group: MOTOR			**Max:** -	

Displays total leakage time constant of motor.

Index:

r0386[0] : 1st. Drive data set (DDS)
r0386[1] : 2nd. Drive data set (DDS)
r0386[2] : 3rd. Drive data set (DDS)

r0394	**CO: Stator resistance IGBT [%]**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**4**
	P-Group: MOTOR			**Max:** -	

Displays stator resistance calculated in [%] from IGBT ON voltage and current amplitude.

Note:

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} <=> 100\%$$

r0395	**CO: Total stator resistance [%]**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**3**
	P-Group: MOTOR			**Max:** -	

Displays the actual stator resistance (combined stator/cable resistance) of the motor as a [%] as a function of the actual stator winding temperature.

Note:

Actual stator winding temperature, refer to r0632

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} <=> 100\%$$

r0396	**CO: Act. rotor resistance**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**3**
	P-Group: MOTOR			**Max:** -	

Displays the actual rotor resistance of the motor equivalent circuit diagram (phase value) as a [%] as a function of the actual rotor winding temperature.

Note:

- Actual rotor winding temperature, refer to r0633
- Values greater than 25 % tend to produce excessive motor slip. Check rated motor speed [rpm] value (P0311).

Rated motor impedance:

$$Z_N = \frac{V_{ph}}{I_{ph}} = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} <=> 100\%$$

3.5 Speed encoder

P0400[3]	**Select encoder type**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: ENCODER	**Active:** Immediately	**QuickComm.:** No	**Max:** 2	

Selects encoder type (number of encoder channels).

Possible Settings:

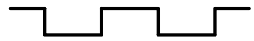
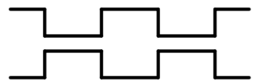
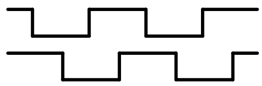
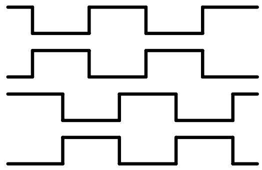
0 Disabled
1 Single channel encoder
2 Quadrature encoder without zero pulse

Index:

P0400[0] : 1st. Drive data set (DDS)
P0400[1] : 2nd. Drive data set (DDS)
P0400[2] : 3rd. Drive data set (DDS)

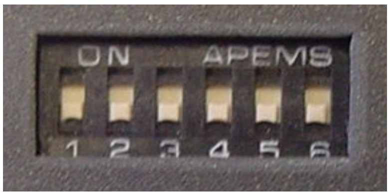
Dependency:

Following table displays the setting of P0400 which depends upon the number of encoder channels:

Parameter	Terminal	Track	Encoder output
P0400 = 1	A		single ended
	A AN		differential
P0400 = 2	A B		single ended
	A AN B BN		differential

Following table displays the setting the of the encoder DIPs on the encoder option modul which have to be set depending on the encoder type (TTL, HTL) and encoder output:

Type	Output	
	single ended	differential
TTL (e.g. 1XP8001-2)	111111	010101
HTL (e.g. 1XP8001-1)	101010	000000



Caution:

When using Vector Control with encoder-feedback , the direction of rotation of the Encoder and Motor must be the same. If this is not achieved, then the functional operation of the Vector Control will not be guaranteed (positive instead of negative feedback). Extreme care must therefore be taken with respect to the connection of the motor to the inverter as well as the correct connection of the encoder to the Encoder module. Motor and Encoder must not be incorrectly wired up !

When commissioning Vector Control with encoder-feedback (VC), the drive should be configured for V/f mode (see P1300) first. Run the drive and compare r0061 with r0021 that should agree in

- sign and
- magnitude (with a deviation of only a few percent).

Only if both criteria are fullfilled, change P1300 and select VC (P1300 = 21 or 23).

P0400 = 1 (single channel encoder) will only allow operation in one direction. If operation in both directions is required, connect an encoder with 2 channels (A and B) and select setting 2. See the Operating Instructions of the encoder module for more information.

Note:

Encoders with zero pulse can also be connected, but the zero pulse is not used in MM4.

The term "quadrature" in setting 2 refers to two periodic functions separated by a quarter cycle or 90 degrees.

r0403	**CO/BO: Encoder status word**			**Min:** -	Level 2
		Datatype: U16	**Unit:** -	**Def:** -	
	P-Group: COMMANDS			**Max:** -	

Displays status word of encoder (in bit format).

Bitfields:

Bit00	Encoder module active	0 NO	1 YES
Bit01	Encoder error	0 NO	1 YES
Bit02	Signal o.k.	0 NO	1 YES
Bit03	Encoder low speed loss	0 NO	1 YES
Bit04	HW timer used	0 NO	1 YES

Details:

See description of seven-segment display given in the "Introduction to MICROMASTER System Parameters" in this manual.

P0408[3]	**Encoder pulses per revolution**			**Min:** 2	Level 2
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 1024	
	P-Group: ENCODER	**Active:** Immediately	**QuickComm.:** No	**Max:** 20000	

Specifies the number of encoder pulses per revolution.

Index:

P0408[0] : 1st. Drive data set (DDS)
P0408[1] : 2nd. Drive data set (DDS)
P0408[2] : 3rd. Drive data set (DDS)

Note:

The encoder resolution (pulses per revolution P0408) which may be entered will be limited by the max. pulse frequency of the encoder option board (f_max = 300 kHz).

The following equation calculates the encoder frequency depending on the encoder resoulution and the rotational speed (rpm). The encoder frequency has to be less than the max. pulse frequency:

$$f_{max} > f = \frac{p0408 \times rpm}{60}$$

P0491[3]	**Reaction on freq. signal loss**			**Min:** 0	Level 2
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0	
	P-Group: ENCODER	**Active:** first confirm	**QuickComm.:** No	**Max:** 1	

Selects reaction on loss of frequency signal.

Possible Settings:

0 Do not change to SLVC
1 Change to SLVC

Index:

P0491[0] : 1st. Drive data set (DDS)
P0491[1] : 2nd. Drive data set (DDS)
P0491[2] : 3rd. Drive data set (DDS)

P0492[3]	**Allowed frequency difference**			**Min:** 0.00	Level 2
	CStat: CT	**Datatype:** Float	**Unit:** Hz	**Def:** 10.00	
	P-Group: ENCODER	**Active:** Immediately	**QuickComm.:** No	**Max:** 100.00	

Parameter P0492 is used for low and high frequency encoder loss detection (fault: F0090).

1. High frequency encoder loss detection:
   This condition occurs when the allowed frequency and the allowed difference of the frequency signals between samples, set in P0492 is exceeded.
   Condition:
   - Act. freq. > P0492 and f(t_2) - f(t_1) > P0492

2. Low frequency encoder loss detection:
   This condition occurs when the actual frequency is < P0492 when encoder loss occurs.
   Condition a):
   - r0061 = 0 and torque limit and then
   - r0061 = 0 with setpoint frequency > 0 for time > P0494

   or
   Condition b):
   - Act. freq. < P0492 and f (t_2) < P0492 and ASIC detect channel B loss

Dependency:

This parameter is updated when motor start-up time P0345 is changed or when a frequency-loop optimisation is performed (P1960 = 1). There is a fixed delay of 40 ms before acting upon loss of encoder at high frequencies.

Caution:

P0492 = 0 (disabled):
When allowed frequency difference is set to 0, both the high frequency and low frequency encoder loss detection is disabled, thus encoder loss will not be detected.

If encoder loss detection is disabled and encoder loss occurs, then operation of the motor may become unstable.

Note:

The value of P0492 should be approx. 2x rated slip, if the motor power is less (<=) 90 kW
The value of P0492 should be approx. 4x rated slip, if the motor power is greater (>) 90 kW

P0494[3]	**Delay frequency loss reaction**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 10	**2**
	P-Group: ENCODER	**Active:** first confirm	**QuickComm.:** No	**Max:** 65000	

Used for low frequency encoder loss detection. If the motor shaft frequency is less than the value in P0492 then encoder loss is detected using a low frequency encoder loss detection algorithm. This parameter selects the delay between loss of encoder at low frequency and reaction to the encoder loss.

Index:

P0494[0] : 1st. Drive data set (DDS)
P0494[1] : 2nd. Drive data set (DDS)
P0494[2] : 3rd. Drive data set (DDS)

Dependency:

This parameter is updated when motor start-up time P0345 is changed or when a frequency-loop optimisation is performed (P1960 = 1).

Caution:

P0494 = 0 (disabled):
When the delay in P0494 is set to 0, then low frequency encoder loss detection is disabled and low frequency encoder loss cannot be detected (high frequency encoder loss detection will still operate if P0492 > 0).

If low frequency encoder loss detection is disabled and encoder should be lost at low frequency, then operation of motor may become unstable.

3.6 Application macros

P0500[3]	**Technological application**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: TECH_APL	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 3	

Selects technological application. Sets control mode (P1300).

Possible Settings:

0 Constant torque
1 Pumps and fans
3 Simple Positioning

Index:

P0500[0] : 1st. Drive data set (DDS)
P0500[1] : 2nd. Drive data set (DDS)
P0500[2] : 3rd. Drive data set (DDS)

Dependency:

See parameter P0205

3.7 Motor temperature

P0601[3]	**Motor temperature sensor**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: MOTOR	**Active:** first confirm	**QuickComm.:** No	**Max:** 2	

Selects motor temperature sensor.

Possible Settings:

0 No sensor
1 PTC thermistor
2 KTY84

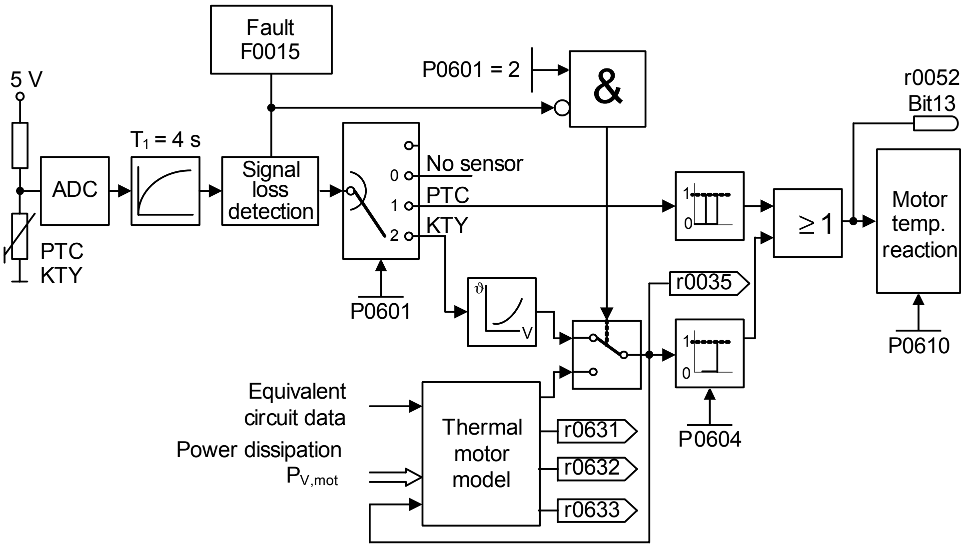
Index:

P0601[0] : 1st. Drive data set (DDS)
P0601[1] : 2nd. Drive data set (DDS)
P0601[2] : 3rd. Drive data set (DDS)

Dependency:

If "no sensor" is selected, the motor temperature monitoring will be done based on the estimated value of the thermal motor model.

The temperature of the motor, when a thermal sensor is connected is calculated using the thermal motor model. When a KTY sensor is fitted, the loss of connection can be detected (Alarm F0015). Using the methods described above the monitoring of the temperature will automatically switch to the thermal model using values derived from the estimated value. Using a PTC sensor the temperature of the motor is calculated by the sensor in conjunction with the thermal model. This allows for redundancy of the monitoring process.



Thermal motor model:
The data, required for the thermal motor model, is estimated from the rating plate data entered during the quick commissioning. This data permits reliable, stable operation for standard Siemens motors. If required, parameter changes must be made for motors from third-party manufacturers. We always recommend that an automatic motor data identification run is made after quick commissioning so that the electrical equivalent circuit diagram data can be determined. This allows a more precise calculation of the losses which occur in the motor which has a positive impact on the accuracy of the thermal motor model.

PTC sensor:
A PTC temperature sensor (Positive-Temperature-Characteristic) is a resistor with a positive temperature characteristic which, at normal temperatures, has a low resistance value (50-100 Ohm). Normally, three PTC temperature sensors are connected in series in the motor (depending on the motor manufacturer), thus producing a "cold resistance value" ranging from 150 to 300 Ohm. PTC temperature sensors are also frequently referred to as cold conductors.

However, at a certain threshold temperature, the resistance rises rapidly. The threshold temperature is selected by the motor manufacturer in such a way that it corresponds to the nominal temperature value of the motor insulation. This allows the change in the resistance value to be deployed to protect the motor, as the PTCs are embedded in the motor windings. PTC temperature sensors are not suitable for measuring temperature.

When the PTC is connected to the control terminals 14 and 15 of the MM4 and the selection motor temperature sensor has been activated by the setting P0601 = 1 (PTC sensor), the PTC temperature sensor then protects the motor by means of the trip device in the MM4.

Should the resistance value of 2000 Ohm be exceeded, the inverter displays error F0011 (motor overheating).

If the resistance value is below 100 Ohm, the error F0015 (no motor temperature signal) is then output.

This protects the motor from overheating and also from a sensor wire breakage.

The motor is additionally monitored by the thermal motor model in the inverter, thus providing a redundant system for monitoring the motor.

KTY84 sensor:
The sensor KTY84 is basically a semi-conductor thermo-sensor (diode), the resistance value of which varies from some 500 Ohm at 0°C to 2600 Ohm at 300°C. It has a positive temperature coefficient and, in contrast to the PTCs, has an almost linear temperature characteristic. The resistor behaviour is comparable to that of a measuring resistor with a very high temperature coefficient.

Note the following when connecting the polarity. Connect the sensor so that the diode is polarized in the operative direction. That means that the anode needs to be connected to terminal 14 = PTC A (+) and the cathode to terminal 15 = PTC B (-).

If the temperature monitoring function is activated with the setting P0601 = 2, the temperature of the sensor (thus that of the motor windings) is then written to parameter r0035.

The motor overheating warning threshold needs to be assigned with parameter P0604 (the works setting is 130°C). This warning threshold depends on the motors thermal class. Also refer to the table below in this context.

Extract of IEC 85	
Insulation class	End temperature
Y	90 °C
A	105 °C
E	120 °C
B	130 °C
F	155 °C
H	180 °C

The motor overheating disturbance threshold is automatically set by the inverter at 10% higher than the temperature declared in parameter P0604.

If the sensor KTY84 is activated, the motor temperature is then additionally calculated via the thermal motor model. Should the sensor KTY84 recognise a wire breakage, an alarm F0015 (loss of the motor temperature signal) is then generated and the thermal motor model is automatically switched to.

Connection failure:
If the connection to the PTC or KTY84 sensor becomes open circuit or short circuit, a fault will be indicated, and by default the drive will trip.

P0604[3] Threshold motor temperature

CStat: CUT	**Datatype:** Float	**Unit:** °C	**Min:** 0.0	**Def:** 130.0	**Max:** 200.0
P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No			**Level 2**

Enters warning threshold for motor temperature protection.

The trip temperature defined always 10 % higher than the warning level P0604. When act. motor temperature exeeds trip temperature than inverter trip as defined in P0610.

$$\vartheta_{trip} = 1.1 \cdot \vartheta_{warn} = 1.1 \cdot P0604$$

ϑ_{warn} : Warning threshold (P0604)
ϑ_{trip} : Trip threshold (max. permissible temperature)

Index:
P0604[0] : 1st. Drive data set (DDS)
P0604[1] : 2nd. Drive data set (DDS)
P0604[2] : 3rd. Drive data set (DDS)

Dependency:
This value should be at least 40°C greater than the motor ambient temperature P0625.

P0604 ≥ P0625 + 40 °C

Note:
Default value depends on P0300 (select motor type).

P0610[3] Motor temperature reaction

CStat: CT	**Datatype:** U16	**Unit:** -	**Min:** 0	**Def:** 2	**Max:** 2
P-Group: MOTOR	**Active:** first confirm	**QuickComm.:** No			**Level 3**

Defines reaction when motor temperature reaches warning threshold.

Possible Settings:
0 Warning, no reaction, no trip
1 Warning, Imax reduction, trip F0011
2 Warning, no reaction, trip F0011

Index:
P0610[0] : 1st. Drive data set (DDS)
P0610[1] : 2nd. Drive data set (DDS)
P0610[2] : 3rd. Drive data set (DDS)

Dependency:

$$\vartheta_{trip} = 1.1 \cdot \vartheta_{warn} = 1.1 \cdot P0604$$

ϑ_{warn} : Warning threshold (P0604)
ϑ_{trip} : Trip threshold (max. permissible temperature)

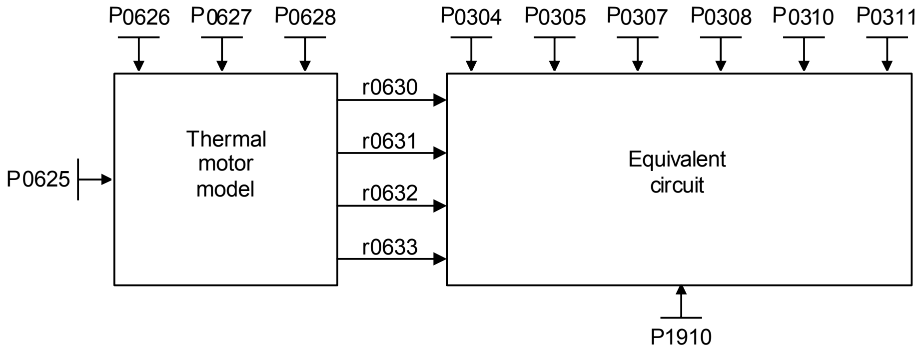
Note:
P0610 = 1:
If the max. permissible current Imax is reduced, this results in a lower output frequency.

The motor temperature depends on many factors. These factors include the size of the motor, the ambient temperature, the previous motor load and naturally the load current.

Because most motors are cooled by fans integrated in the motor and running at the motor speed, the speed of the motor is also important. Clearly a motor running with a high current (maybe due to boost) and a low speed, will overheat more quickly than one running at 50 or 60 Hz, full load. The MM4 take account of these factors.

P0625[3]	**Ambient motor temperature**				**Min:**	-40.0	Level **3**
	CStat: CUT	**Datatype:** Float	**Unit:** °C		**Def:**	20.0	
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No		**Max:**	80.0	

Ambient temperature of motor. The parameter for the stator resistance P0350 and rotor resistance P0354 relate to the ambient temperature.



Index:

P0625[0] : 1st. Drive data set (DDS)
P0625[1] : 2nd. Drive data set (DDS)
P0625[2] : 3rd. Drive data set (DDS)

Note:

Following items should be considered when using P0625:
- The ambient temperature has to be entered prior to motor data identification.
- An accuracy of +/- 5°C is adequate.
- The motor data identification should be carried out on a cold motor (ambient temperature = stator temperature = rotor temperature).
- The highest accuracy at temperature adaption of the stator resistance and rotor resistance can be achieved by connecting a KTY84 sensor.

P0626[3]	**Overtemperature stator iron**				**Min:**	20.0	Level **4**
	CStat: CUT	**Datatype:** Float	**Unit:** °C		**Def:**	50.0	
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No		**Max:**	200.0	

Overtemperature of stator iron.

Index:

P0626[0] : 1st. Drive data set (DDS)
P0626[1] : 2nd. Drive data set (DDS)
P0626[2] : 3rd. Drive data set (DDS)

Note:

See parameter P0627

P0627[3]	**Overtemperature stator winding**			**Min:** 20.0	Level **4**
	CStat: CUT	**Datatype:** Float	**Unit:** °C	**Def:** 80.0	
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.0	

Overtemperature of the stator winding.

Index:

P0627[0] : 1st. Drive data set (DDS)
P0627[1] : 2nd. Drive data set (DDS)
P0627[2] : 3rd. Drive data set (DDS)

Note:

Temperature rise:
The losses occurring in the motor are converted into heat (thermal energy). This is the reason that permissible limit temperature rises are defined for windings and other mechanical parts and components of the motors. The temperature rise of the motor is defined as the difference between the temperature of a motor component (e.g. rotor winding) and the temperature of the cooling medium (e.g. ambient air temperature) (EN 60034-1). The temperature rise determined by the motor manufacturer by making the appropriate measurements is the difference between the temperature of the winding at the end of the measurement and the temperature of the cooling medium.

$\vartheta_{ü} = \vartheta_2 - \vartheta_K$

$\vartheta_{ü}$: Temperature rise
ϑ_2 : Temperature at the end of the measurement
ϑ_K : Cooling-medium temperature

The permissible temperature rises of the windings is classified in insulating classes. The insulating class valid for the particular motor is specified on the motor rating plate.

The following points should be carefully observed:
- The temperature rises of the stator/rotor winding are only applicable for sinusoidal operation (basic fundamental).
- The temperature of stator/rotor winding rises when the motor is fed with a sinusoidal voltage as well as also losses (modulation losses, losses due to harmonics) caused as a result of drive converter operation.
- The value may only be modified if the motor is in the cold condition (ambient temperature). The motor identification run should be carried-out after the value has been changed.

P0628[3]	**Overtemperature rotor winding**			**Min:** 20.0	Level **4**
	CStat: CUT	**Datatype:** Float	**Unit:** °C	**Def:** 100.0	
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.0	

Overtemperature of the rotor winding.

Index:

P0628[0] : 1st. Drive data set (DDS)
P0628[1] : 2nd. Drive data set (DDS)
P0628[2] : 3rd. Drive data set (DDS)

Note:

See parameter P0627

r0630[3]	**CO: Ambient temperature**		**Min:** -	Level **4**
		Datatype: Float	**Unit:** °C	**Def:** -	
	P-Group: MOTOR			**Max:** -	

Displays ambient temperature of motor mass model.

Index:

r0630[0] : 1st. Drive data set (DDS)
r0630[1] : 2nd. Drive data set (DDS)
r0630[2] : 3rd. Drive data set (DDS)

r0631[3]	**CO: Stator iron temperature**			**Min:** -	Level **4**
		Datatype: Float	**Unit:** °C	**Def:** -	
	P-Group: MOTOR			**Max:** -	

Displays iron temperature of motor mass model.

Index:

r0631[0] : 1st. Drive data set (DDS)
r0631[1] : 2nd. Drive data set (DDS)
r0631[2] : 3rd. Drive data set (DDS)

r0632[3]	**CO: Stator winding temperature**			**Min:** -	Level **4**
		Datatype: Float	**Unit:** °C	**Def:** -	
	P-Group: MOTOR			**Max:** -	

Displays stator winding temperature of motor mass model.

Index:

r0632[0] : 1st. Drive data set (DDS)
r0632[1] : 2nd. Drive data set (DDS)
r0632[2] : 3rd. Drive data set (DDS)

r0633[3]	**CO: Rotor winding temperature**			**Min:** -	Level
		Datatype: Float	**Unit:** °C	**Def:** -	**4**
	P-Group: MOTOR			**Max:** -	

Displays rotor winding temperature of motor mass model.

Index:

r0633[0] : 1st. Drive data set (DDS)
r0633[1] : 2nd. Drive data set (DDS)
r0633[2] : 3rd. Drive data set (DDS)

P0640[3]	**Motor overload factor [%]**			**Min:** 10.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 150.0	**2**
	P-Group: MOTOR	**Active:** Immediately	**QuickComm.:** Yes	**Max:** 400.0	

Defines motor overload current limit in [%] relative to P0305 (rated motor current).

Index:

P0640[0] : 1st. Drive data set (DDS)
P0640[1] : 2nd. Drive data set (DDS)
P0640[2] : 3rd. Drive data set (DDS)

Dependency:

Limited to maximum inverter current or to 400 % of rated motor current (P0305), whichever is the lower.

$$P0640_{max} = \frac{\min(r0209, 4 \cdot P0305)}{P0305} \cdot 100$$

Details:

See function diagram for current limitation.

3.8 Command source

P0700[3]	Selection of command source			Min: 0	Level 1
	CStat: CT	Datatype: U16	Unit: -	Def: 2	
	P-Group: COMMANDS	Active: first confirm	QuickComm.: Yes	Max: 6	

Selects digital command source.

Possible Settings:

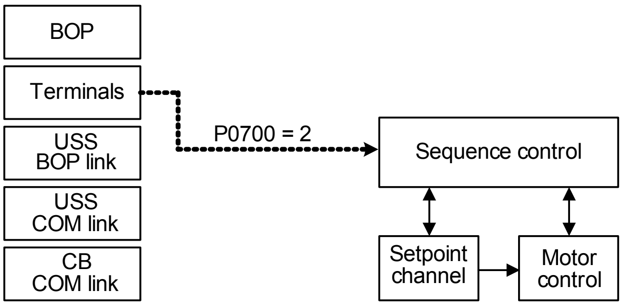
0 Factory default setting
1 BOP (keypad)
2 Terminal
4 USS on BOP link
5 USS on COM link
6 CB on COM link

Index:

P0700[0] : 1st. Command data set (CDS)
P0700[1] : 2nd. Command data set (CDS)
P0700[2] : 3rd. Command data set (CDS)

Example:

Changing form P0700 = 1 to P0700 = 2 sets all digital inputs to default settings.



Caution:

Be aware, by changing of parameter P0700 all BI parameters are reset to the default value or modified as listed in the table below.

If the Inverter is being controlled via the AOP, select USS (with the corresponding interface) for the Command Source. If the AOP is connected to the BOP-Link Interface, then set Parameter P0700 to the value 4 (P0700 = 4).

Note:

Changing this parameter sets (to default) all settings on item selected (see table).

	P0700 = 0	P0700 = 1	P0700 = 2	P0700 = 4	P0700 = 5	P0700 = 6
P0701	1	0	1	0	0	0
P0702	12	0	12	0	0	0
P0703	9	9	9	9	9	9
P0704	15	15	15	15	15	15
P0705	15	15	15	15	15	15
P0706	15	15	15	15	15	15
P0707	0	0	0	0	0	0
P0708	0	0	0	0	0	0
P0731	52.3	52.3	52.3	52.3	52.3	52.3
P0732	52.7	52.7	52.7	52.7	52.7	52.7
P0733	0.0	0.0	0.0	0.0	0.0	0.0

P0800	0.0	0.0	0.0	0.0	0.0	0.0
P0801	0.0	0.0	0.0	0.0	0.0	0.0

P0840	722.0	19.0	722.0	2032.0	2036.0	2090.0
P0842	0.0	0.0	0.0	0.0	0.0	0.0
P0844	1.0	19.1	1.0	2032.1	2036.1	2090.1
P0845	19.1	19.1	19.1	19.1	19.1	19.1
P0848	1.0	1.0	1.0	2032.2	2036.2	2090.2
P0849	1.0	1.0	1.0	1.0	1.0	1.0
P0852	1.0	1.0	1.0	2032.3	2036.3	2090.3

	P0700 = 0	**P0700 = 1**	**P0700 = 2**	**P0700 = 4**	**P0700 = 5**	**P0700 = 6**
P1020	0.0	0.0	0.0	0.0	0.0	0.0
P1021	0.0	0.0	0.0	0.0	0.0	0.0
P1022	0.0	0.0	0.0	0.0	0.0	0.0
P1023	722.3	722.3	722.3	722.3	722.3	722.3
P1026	722.4	722.4	722.4	722.4	722.4	722.4
P1028	722.5	722.5	722.5	722.5	722.5	722.5
P1035	19.13	19.13	19.13	2032.13	2036.13	2090.13
P1036	19.14	19.14	19.14	2032.14	2036.14	2090.14
P1055	0.0	19.8	0.0	2032.8	2036.8	2090.8
P1056	0.0	0.0	0.0	2032.9	2036.9	2090.9
P1074	0.0	0.0	0.0	0.0	0.0	0.0
P1110	0.0	0.0	0.0	0.0	0.0	0.0
P1113	722.1	19.11	722.1	2032.11	2036.11	2090.11
P1124	0.0	0.0	0.0	0.0	0.0	0.0
P1140	1.0	1.0	1.0	2032.4	2036.4	2090.4
P1141	1.0	1.0	1.0	2032.5	2036.5	2090.5
P1142	1.0	1.0	1.0	2032.6	2036.6	2090.6
P1230	0.0	0.0	0.0	0.0	0.0	0.0
P1477	0.0	0.0	0.0	0.0	0.0	0.0
P1501	0.0	0.0	0.0	0.0	0.0	0.0
P2103	722.2	722.2	722.2	722.2	722.2	722.2
P2104	0.0	0.0	0.0	2032.7	2036.7	2090.7
P2106	1.0	1.0	1.0	1.0	1.0	1.0
P2200	0.0	0.0	0.0	0.0	0.0	0.0
P2220	0.0	0.0	0.0	0.0	0.0	0.0
P2221	0.0	0.0	0.0	0.0	0.0	0.0
P2222	0.0	0.0	0.0	0.0	0.0	0.0
P2223	722.3	722.3	722.3	722.3	722.3	722.3
P2226	722.4	722.4	722.4	722.4	722.4	722.4
P2228	722.5	722.5	722.5	722.5	722.5	722.5
P2235	19.13	19.13	19.13	2032.13	2036.13	2090.13
P2236	19.14	19.14	19.14	2032.14	2036.14	2090.14

The following parameters are not overwritten when changing P0700:

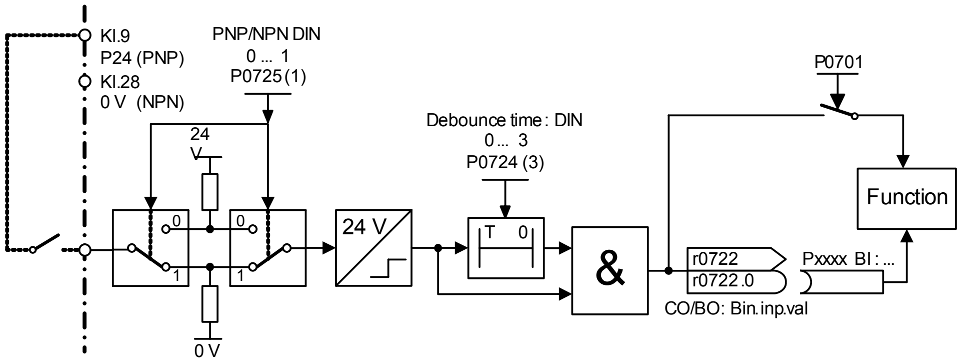
P0810	P0811	P0820	P0821	P2810	P2812	P2814
P2816	P2818	P2820	P2822	P2824	P2826	P2828
P2830	P2832	P2834	P2837	P2840	P2843	P2846
P2849	P2854	P2859	P2864			

3.9 Digital inputs

P0701[3]	**Function of digital input 1**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 1	**2**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 99	

Selects function of digital input 1.

DIN channel (e.g. DIN1 - PNP (P0725 = 1))



Possible Settings:

0 Digital input disabled
1 ON/OFF1
2 ON reverse /OFF1
3 OFF2 - coast to standstill
4 OFF3 - quick ramp-down
9 Fault acknowledge
10 JOG right
11 JOG left
12 Reverse
13 MOP up (increase frequency)
14 MOP down (decrease frequency)
15 Fixed setpoint (Direct selection)
16 Fixed setpoint (Direct selection + ON)
17 Fixed setpoint (Binary coded selection + ON)
25 DC brake enable
29 External trip
33 Disable additional freq setpoint
99 Enable BICO parameterization

Index:

P0701[0] : 1st. Command data set (CDS)
P0701[1] : 2nd. Command data set (CDS)
P0701[2] : 3rd. Command data set (CDS)

Dependency:

Setting 99 (enable BICO parameterization) requires
- P0700 command source or
- P0010 = 1, P3900 = 1, 2 or 3 quick commissioning or
- P0010 = 30, P0970 = 1 factory reset in order to reset.

Notice:

Setting 99 (BICO) for expert use only.

P0702[3]	**Function of digital input 2**				**Min:**	0	Level
	CStat:	CT	**Datatype:** U16	**Unit:** -	**Def:**	12	**2**
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:**	99	

Selects function of digital input 2.

Possible Settings:

0 Digital input disabled
1 ON/OFF1
2 ON reverse /OFF1
3 OFF2 - coast to standstill
4 OFF3 - quick ramp-down
9 Fault acknowledge
10 JOG right
11 JOG left
12 Reverse
13 MOP up (increase frequency)
14 MOP down (decrease frequency)
15 Fixed setpoint (Direct selection)
16 Fixed setpoint (Direct selection + ON)
17 Fixed setpoint (Binary coded selection + ON)
25 DC brake enable
29 External trip
33 Disable additional freq setpoint
99 Enable BICO parameterization

Index:

P0702[0] : 1st. Command data set (CDS)
P0702[1] : 2nd. Command data set (CDS)
P0702[2] : 3rd. Command data set (CDS)

Details:

See P0701 (function of digital input1).

P0703[3]	**Function of digital input 3**				**Min:**	0	Level
	CStat:	CT	**Datatype:** U16	**Unit:** -	**Def:**	9	**2**
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:**	99	

Selects function of digital input 3.

Possible Settings:

0 Digital input disabled
1 ON/OFF1
2 ON reverse /OFF1
3 OFF2 - coast to standstill
4 OFF3 - quick ramp-down
9 Fault acknowledge
10 JOG right
11 JOG left
12 Reverse
13 MOP up (increase frequency)
14 MOP down (decrease frequency)
15 Fixed setpoint (Direct selection)
16 Fixed setpoint (Direct selection + ON)
17 Fixed setpoint (Binary coded selection + ON)
25 DC brake enable
29 External trip
33 Disable additional freq setpoint
99 Enable BICO parameterization

Index:

P0703[0] : 1st. Command data set (CDS)
P0703[1] : 2nd. Command data set (CDS)
P0703[2] : 3rd. Command data set (CDS)

Details:

See P0701 (function of digital input 1).

P0704[3]	Function of digital input 4				Min:	0	Level 2
	CStat:	CT	**Datatype:** U16	**Unit:** -	**Def:**	15	
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:**	99	

Selects function of digital input 4.

Possible Settings:

0 Digital input disabled
1 ON/OFF1
2 ON reverse /OFF1
3 OFF2 - coast to standstill
4 OFF3 - quick ramp-down
9 Fault acknowledge
10 JOG right
11 JOG left
12 Reverse
13 MOP up (increase frequency)
14 MOP down (decrease frequency)
15 Fixed setpoint (Direct selection)
16 Fixed setpoint (Direct selection + ON)
17 Fixed setpoint (Binary coded selection + ON)
25 DC brake enable
29 External trip
33 Disable additional freq setpoint
99 Enable BICO parameterization

Index:

P0704[0] : 1st. Command data set (CDS)
P0704[1] : 2nd. Command data set (CDS)
P0704[2] : 3rd. Command data set (CDS)

Details:

See P0701 (function of digital input 1).

P0705[3]	Function of digital input 5				Min:	0	Level 2
	CStat:	CT	**Datatype:** U16	**Unit:** -	**Def:**	15	
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:**	99	

Selects function of digital input 5.

Possible Settings:

0 Digital input disabled
1 ON/OFF1
2 ON reverse /OFF1
3 OFF2 - coast to standstill
4 OFF3 - quick ramp-down
9 Fault acknowledge
10 JOG right
11 JOG left
12 Reverse
13 MOP up (increase frequency)
14 MOP down (decrease frequency)
15 Fixed setpoint (Direct selection)
16 Fixed setpoint (Direct selection + ON)
25 DC brake enable
29 External trip
33 Disable additional freq setpoint
99 Enable BICO parameterization

Index:

P0705[0] : 1st. Command data set (CDS)
P0705[1] : 2nd. Command data set (CDS)
P0705[2] : 3rd. Command data set (CDS)

Details:

See P0701 (function of digital input 1).

P0706[3]	**Function of digital input 6**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 15	**2**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 99	

Selects function of digital input 6.

Possible Settings:

0 Digital input disabled
1 ON/OFF1
2 ON reverse /OFF1
3 OFF2 - coast to standstill
4 OFF3 - quick ramp-down
9 Fault acknowledge
10 JOG right
11 JOG left
12 Reverse
13 MOP up (increase frequency)
14 MOP down (decrease frequency)
15 Fixed setpoint (Direct selection)
16 Fixed setpoint (Direct selection + ON)
25 DC brake enable
29 External trip
33 Disable additional freq setpoint
99 Enable BICO parameterization

Index:

P0706[0] : 1st. Command data set (CDS)
P0706[1] : 2nd. Command data set (CDS)
P0706[2] : 3rd. Command data set (CDS)

Details:

See P0701 (function of digital input 1).

P0707[3]	**Function of digital input 7**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 99	

Selects function of digital input 7 (via analog input).

Possible Settings:

0 Digital input disabled
1 ON/OFF1
2 ON reverse /OFF1
3 OFF2 - coast to standstill
4 OFF3 - quick ramp-down
9 Fault acknowledge
10 JOG right
11 JOG left
12 Reverse
13 MOP up (increase frequency)
14 MOP down (decrease frequency)
25 DC brake enable
29 External trip
33 Disable additional freq setpoint
99 Enable BICO parameterization

Index:

P0707[0] : 1st. Command data set (CDS)
P0707[1] : 2nd. Command data set (CDS)
P0707[2] : 3rd. Command data set (CDS)

Note:

Signals above 4 V are active, signals below 1,6 V are inactive.

Details:

See P0701 (function of digital input 1).

P0708[3]	Function of digital input 8				Min:	0	Level
	CStat:	CT	Datatype: U16	Unit: -	Def:	0	2
	P-Group:	COMMANDS	Active: first confirm	QuickComm.: No	Max:	99	

Selects function of digital input 8 (via analog input)

Possible Settings:

0 Digital input disabled
1 ON/OFF1
2 ON reverse /OFF1
3 OFF2 - coast to standstill
4 OFF3 - quick ramp-down
9 Fault acknowledge
10 JOG right
11 JOG left
12 Reverse
13 MOP up (increase frequency)
14 MOP down (decrease frequency)
25 DC brake enable
29 External trip
33 Disable additional freq setpoint
99 Enable BICO parameterization

Index:

P0708[0] : 1st. Command data set (CDS)
P0708[1] : 2nd. Command data set (CDS)
P0708[2] : 3rd. Command data set (CDS)

Note:

Signals above 4 V are active, signals below 1,6 V are inactive.

Details:

See P0701 (function of digital input 1).

P0719[3]	Selection of cmd. & freq. setp.				Min:	0	Level
	CStat:	CT	Datatype: U16	Unit: -	Def:	0	3
	P-Group:	COMMANDS	Active: first confirm	QuickComm.: No	Max:	67	

Central switch to select control command source for inverter.
Switches command and setpoint source between freely programmable BICO parameters and fixed command/setpoint profiles. Command and setpoint sources can be changed independently.

The tens digit chooses the command source and the units digit chooses the setpoint source.

Possible Settings:

0	Cmd = BICO parameter	Setpoint = BICO parameter
1	Cmd = BICO parameter	Setpoint = MOP setpoint
2	Cmd = BICO parameter	Setpoint = Analog setpoint
3	Cmd = BICO parameter	Setpoint = Fixed frequency
4	Cmd = BICO parameter	Setpoint = USS on BOP link
5	Cmd = BICO parameter	Setpoint = USS on COM link
6	Cmd = BICO parameter	Setpoint = CB on COM link
7	Cmd = BICO parameter	Setpoint = Analog 2 setp
10	Cmd = BOP	Setpoint = BICO parameter
11	Cmd = BOP	Setpoint = MOP setpoint
12	Cmd = BOP	Setpoint = Analog setpoint
13	Cmd = BOP	Setpoint = Fixed frequency
15	Cmd = BOP	Setpoint = USS on COM link
16	Cmd = BOP	Setpoint = CB on COM link
17	Cmd = BOP	Setpoint = Analog 2 setp
40	Cmd = USS on BOP link	Setpoint = BICO parameter
41	Cmd = USS on BOP link	Setpoint = MOP setpoint
42	Cmd = USS on BOP link	Setpoint = Analog setpoint
43	Cmd = USS on BOP link	Setpoint = Fixed frequency
44	Cmd = USS on BOP link	Setpoint = USS on BOP link
45	Cmd = USS on BOP link	Setpoint = USS on COM link
46	Cmd = USS on BOP link	Setpoint = CB on COM link
47	Cmd = USS on BOP link	Setpoint = Analog 2 setp
50	Cmd = USS on COM link	Setpoint = BICO parameter
51	Cmd = USS on COM link	Setpoint = MOP setpoint
52	Cmd = USS on COM link	Setpoint = Analog setpoint
53	Cmd = USS on COM link	Setpoint = Fixed frequency
54	Cmd = USS on COM link	Setpoint = USS on BOP link
55	Cmd = USS on COM link	Setpoint = USS on COM link
57	Cmd = USS on COM link	Setpoint = Analog 2 setp
60	Cmd = CB on COM link	Setpoint = BICO parameter
61	Cmd = CB on COM link	Setpoint = MOP setpoint
62	Cmd = CB on COM link	Setpoint = Analog setpoint
63	Cmd = CB on COM link	Setpoint = Fixed frequency
64	Cmd = CB on COM link	Setpoint = USS on BOP link
66	Cmd = CB on COM link	Setpoint = CB on COM link
67	Cmd = CB on COM link	Setpoint = Analog 2 setp

Index:

P0719[0] : 1st. Command data set (CDS)
P0719[1] : 2nd. Command data set (CDS)
P0719[2] : 3rd. Command data set (CDS)

Note:

Using parameter P0719, it is possible to select the command or setpoint sources without changing the BICO connections (this is contrary to P0700 / P1000). However, it is not possible to change the complete connection table (refer to P0700 and P1000). Using P0719, depending on the value, only the BICO parameters listed in the following table are internally overwritten - this means that these BICO parameters are inactive.

Command source:

	P0719 =				
	0 ... 9	10 ... 19	40 ... 49	50 ... 59	60 ... 69
P0840	X	–	–	–	–
P0844	X	–	–	–	–
P0848	X	X	–	–	–
P0852	X	X	–	–	–
P1035	X	–	–	–	–
P1036	X	X	–	–	–
P1055	X	–	–	–	–
P1056	X	X	–	–	–
P1113	X	–	–	–	–
P1140	X	X	–	–	–
P1141	X	X	–	–	–
P1142	X	X	–	–	–
P1143	X	X	–	–	–

Setpoint source:

	P0719 =	
	0, 10, 20, 40, 50, 60	all other values
P1070	X	–

X = BICO parameter active
– = BICO parameter inactive

BICO connections made previously remain unchanged.

r0720 Number of digital inputs

Datatype: U16	**Unit:** -	**Min:** -	Level
P-Group: COMMANDS		**Def:** -	**3**
		Max: -	

Displays number of digital inputs.

r0722 CO/BO: Binary input values

Datatype: U16	**Unit:** -	**Min:** -	Level
P-Group: COMMANDS		**Def:** -	**2**
		Max: -	

Displays status of digital inputs.

Bitfields:

```
Bit00   Digital input 1                      0  OFF        1  ON
Bit01   Digital input 2                      0  OFF        1  ON
Bit02   Digital input 3                      0  OFF        1  ON
Bit03   Digital input 4                      0  OFF        1  ON

Bit04   Digital input 5                      0  OFF        1  ON
Bit05   Digital input 6                      0  OFF        1  ON
Bit06   Digital input 7 (via ADC 1)          0  OFF        1  ON
Bit07   Digital input 8 (via ADC 2)          0  OFF        1  ON
```

Note:

Segment is lit when signal is active.

P0724	**Debounce time for digital inputs**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 3	**3**
	P-Group: COMMANDS	**Active:** Immediately	**QuickComm.:** No	**Max:** 3	

Defines debounce time (filtering time) used for digital inputs.

Possible Settings:

0 No debounce time
1 2.5 ms debounce time
2 8.2 ms debounce time
3 12.3 ms debounce time

P0725	**PNP / NPN digital inputs**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 1	**3**
	P-Group: COMMANDS	**Active:** Immediately	**QuickComm.:** No	**Max:** 1	

Switches between active high (PNP) and active low (NPN). This is valid for all digital inputs simultaneously.

The following is valid by using the internal supply:

Possible Settings:

0 NPN mode ==> low active
1 PNP mode ==> high active

Value:

NPN: Terminals 5/6/7/8/16/17 must be connected via terminal 28 (O V).
PNP: Terminals 5/6/7/8/16/17 must be connected via terminal 9 (24 V).

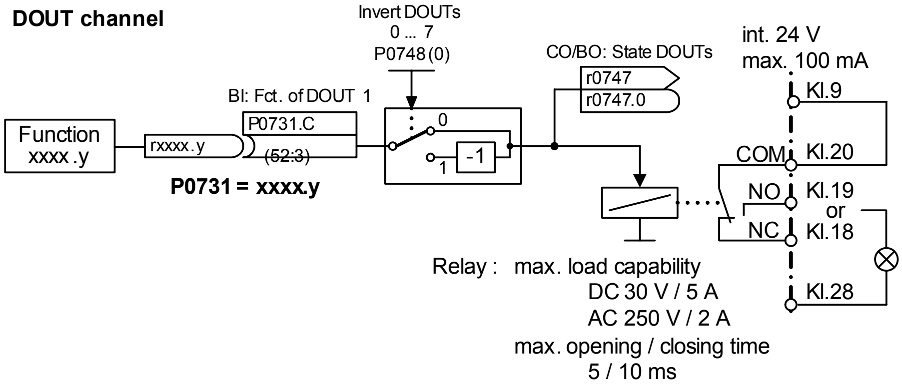
3.10 Digital outputs

r0730	**Number of digital outputs**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: COMMANDS			**Max:** -	

Displays number of digital outputs (relays).

P0731[3]	**BI: Function of digital output 1**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 52:3	**2**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines source of digital output 1.



Index:

P0731[0] : 1st. Command data set (CDS)
P0731[1] : 2nd. Command data set (CDS)
P0731[2] : 3rd. Command data set (CDS)

Common Settings:

52.0	Drive ready	0	Closed
52.1	Drive ready to run	0	Closed
52.2	Drive running	0	Closed
52.3	Drive fault active	0	Closed
52.4	OFF2 active	1	Closed
52.5	OFF3 active	1	Closed
52.6	Switch on inhibit active	0	Closed
52.7	Drive warning active	0	Closed
52.8	Deviation setpoint/actual value	1	Closed
52.9	PZD control (Process Data Control)	0	Closed
52.A	Maximum frequency reached	0	Closed
52.B	Warning: Motor current limit	1	Closed
52.C	Motor holding brake (MHB) active	0	Closed
52.D	Motor overload	1	Closed
52.E	Motor running direction right	0	Closed
52.F	Inverter overload	1	Closed
53.0	DC brake active	0	Closed
53.1	Act. freq. f_act > P2167 (f_off)	0	Closed
53.2	Act. freq. f_act <= P1080 (f_min)	0	Closed
53.3	Act. current r0027 > P2170	0	Closed
53.4	Act. freq. f_act > P2155 (f_1)	0	Closed
53.5	Act. freq. f_act <= P2155 (f_1)	0	Closed
53.6	Act. freq. f_act >= setpoint	0	Closed
53.7	Act. Vdc r0026 < P2172	0	Closed
53.8	Act. Vdc r0026 > P2172	0	Closed
53.A	PID output r2294 == P2292 (PID_min)	0	Closed
53.B	PID output r2294 == P2291 (PID_max)	0	Closed

Details:

Display functions ==> see parameter r0052, r0053
Motor holding brake ==> see parameter P1215
DC brake ==> see parameter P1232, P1233

P0732[3]	BI: Function of digital output 2			Min:	0:0	Level
	CStat: CUT	Datatype: U32	Unit: -	Def:	52:7	2
	P-Group: COMMANDS	Active: first confirm	QuickComm.: No	Max:	4000:0	

Defines source of digital output 2.

Index:

P0732[0] : 1st. Command data set (CDS)
P0732[1] : 2nd. Command data set (CDS)
P0732[2] : 3rd. Command data set (CDS)

Common Settings:

52.0	Drive ready	0	Closed
52.1	Drive ready to run	0	Closed
52.2	Drive running	0	Closed
52.3	Drive fault active	0	Closed
52.4	OFF2 active	1	Closed
52.5	OFF3 active	1	Closed
52.6	Switch on inhibit active	0	Closed
52.7	Drive warning active	0	Closed
52.8	Deviation setpoint/actual value	1	Closed
52.9	PZD control (Process Data Control)	0	Closed
52.A	Maximum frequency reached	0	Closed
52.B	Warning: Motor current limit	1	Closed
52.C	Motor holding brake (MHB) active	0	Closed
52.D	Motor overload	1	Closed
52.E	Motor running direction right	0	Closed
52.F	Inverter overload	1	Closed
53.0	DC brake active	0	Closed
53.1	Act. freq. f_act > P2167 (f_off)	0	Closed
53.2	Act. freq. f_act <= P1080 (f_min)	0	Closed
53.3	Act. current r0027 > P2170	0	Closed
53.4	Act. freq. f_act > P2155 (f_1)	0	Closed
53.5	Act. freq. f_act <= P2155 (f_1)	0	Closed
53.6	Act. freq. f_act >= setpoint	0	Closed
53.7	Act. Vdc r0026 < P2172	0	Closed
53.8	Act. Vdc r0026 > P2172	0	Closed
53.A	PID output r2294 == P2292 (PID_min)	0	Closed
53.B	PID output r2294 == P2291 (PID_max)	0	Closed

P0733[3]	BI: Function of digital output 3			Min:	0:0	Level
	CStat: CUT	Datatype: U32	Unit: -	Def:	0:0	2
	P-Group: COMMANDS	Active: first confirm	QuickComm.: No	Max:	4000:0	

Defines source of digital output 3.

Index:

P0733[0] : 1st. Command data set (CDS)
P0733[1] : 2nd. Command data set (CDS)
P0733[2] : 3rd. Command data set (CDS)

Common Settings:

52.0	Drive ready	0	Closed
52.1	Drive ready to run	0	Closed
52.2	Drive running	0	Closed
52.3	Drive fault active	0	Closed
52.4	OFF2 active	1	Closed
52.5	OFF3 active	1	Closed
52.6	Switch on inhibit active	0	Closed
52.7	Drive warning active	0	Closed
52.8	Deviation setpoint/actual value	1	Closed
52.9	PZD control (Process Data Control)	0	Closed
52.A	Maximum frequency reached	0	Closed
52.B	Warning: Motor current limit	1	Closed
52.C	Motor holding brake (MHB) active	0	Closed
52.D	Motor overload	1	Closed
52.E	Motor running direction right	0	Closed
52.F	Inverter overload	1	Closed
53.0	DC brake active	0	Closed
53.1	Act. freq. f_act > P2167 (f_off)	0	Closed
53.2	Act. freq. f_act <= P1080 (f_min)	0	Closed
53.3	Act. current r0027 > P2170	0	Closed
53.4	Act. freq. f_act > P2155 (f_1)	0	Closed
53.5	Act. freq. f_act <= P2155 (f_1)	0	Closed
53.6	Act. freq. f_act >= setpoint	0	Closed
53.7	Act. Vdc r0026 < P2172	0	Closed
53.8	Act. Vdc r0026 > P2172	0	Closed
53.A	PID output r2294 == P2292 (PID_min)	0	Closed
53.B	PID output r2294 == P2291 (PID_max)	0	Closed

r0747	**CO/BO: State of digital outputs**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: COMMANDS			**Max:** -	

Displays status of digital outputs (also includes inversion of digital outputs via P0748).

Bitfields:

Bit00	Digital output 1 energized	0	NO	1	YES
Bit01	Digital output 2 energized	0	NO	1	YES
Bit02	Digital output 3 energized	0	NO	1	YES

Dependency:

Bit 0 = 0 :
Relay de-energized / contacts open

Bit 0 = 1 :
Relay energized / contacts closed

P0748	**Invert digital outputs**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 7	

Defines high and low states of relay for a given function.

Bitfields:

Bit00	Invert digital output 1	0	NO	1	YES
Bit01	Invert digital output 2	0	NO	1	YES
Bit02	Invert digital output 3	0	NO	1	YES

3.11 Analog inputs

r0750	**Number of ADCs**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TERMINAL			**Max:** -	

Displays number of analog inputs available.

r0751	**BO: Status word of ADC**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**4**
	P-Group: TERMINAL			**Max:** -	

Displays status of analog input.

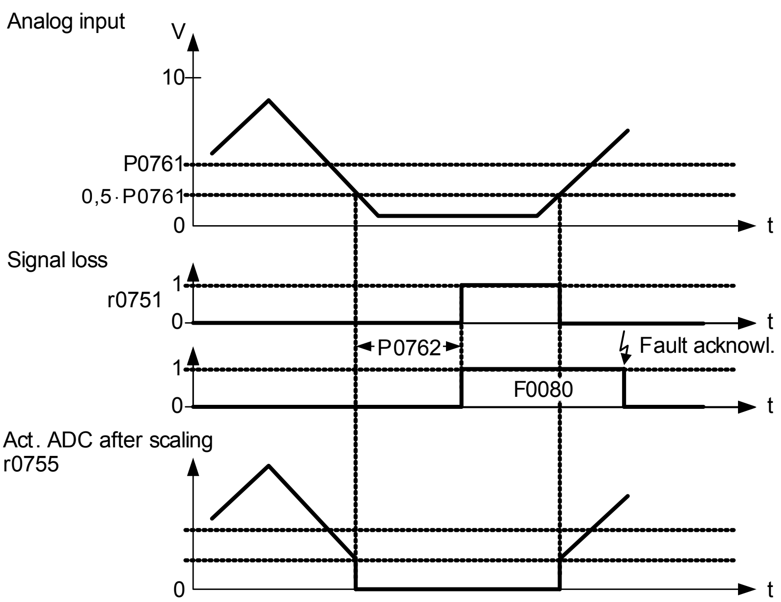
Bitfields:

Bit00	Signal lost on ADC 1	0	NO	1	YES
Bit01	Signal lost on ADC 2	0	NO	1	YES

Dependency:

The following limitations/secondary conditions apply for the wire breakage monitoring:

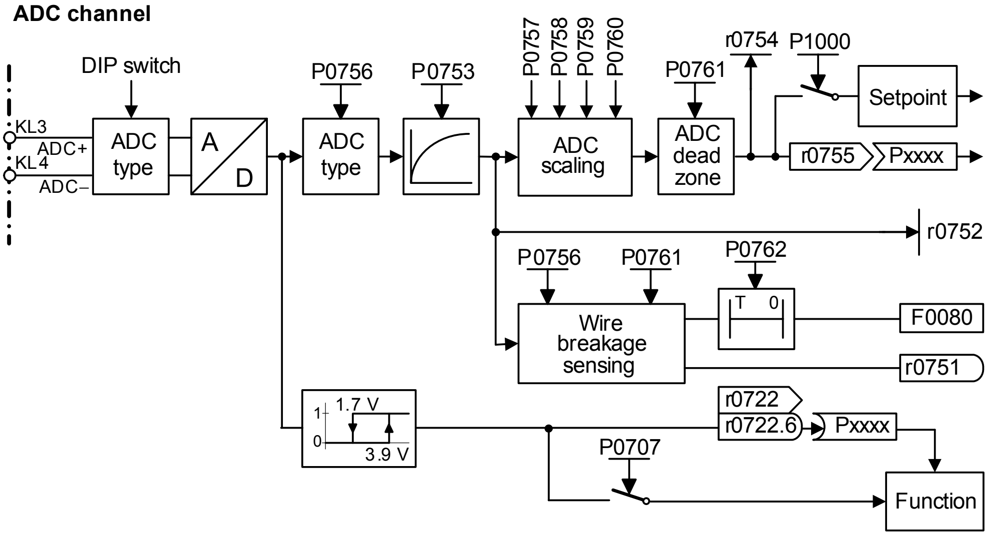
- For P0756, the monitoring must be activated
- Width of the ADC deadzone P0761 > 0
- Wire breakage / signal loss F0080 is detected if the ADC input quantity is less than 0.5 * P0761.



r0752[2]	Act. input of ADC [V] or [mA]			Min: -	Level
		Datatype: Float	Unit: -	Def: -	2
	P-Group: TERMINAL			Max: -	

Displays smoothed analog input value in volts before the characteristic block.

ADC channel



Index:
r0752[0] : Analog input 1 (ADC 1)
r0752[1] : Analog input 2 (ADC 2)

P0753[2]	Smooth time ADC			Min: 0	Level
	CStat: CUT	Datatype: U16	Unit: ms	Def: 3	3
	P-Group: TERMINAL	Active: first confirm	QuickComm.: No	Max: 10000	

Defines filter time (PT1 filter) in [ms] for analog input.

Index:
P0753[0] : Analog input 1 (ADC 1)
P0753[1] : Analog input 2 (ADC 2)

Note:
Increasing this time (smooth) reduces jitter but slows down response to the analog input.

P0753 = 0 : No filtering

r0754[2]	Act. ADC value after scaling [%]			Min: -	Level
		Datatype: Float	Unit: %	Def: -	2
	P-Group: TERMINAL			Max: -	

Shows smoothed value of analog input in [%] after scaling block.

Index:
r0754[0] : Analog input 1 (ADC 1)
r0754[1] : Analog input 2 (ADC 2)

Dependency:
P0757 to P0760 define range (ADC scaling).

r0755[2] CO: Act. ADC after scal. [4000h]

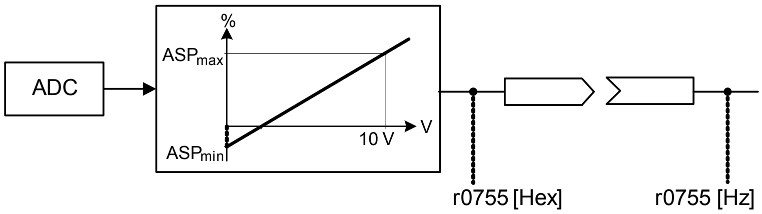
				Level
	Datatype: I16	Unit: -	Min: -	2
P-Group: TERMINAL			Def: -	
			Max: -	

Displays analog input, scaled using ASPmin and ASPmax.

Analog setpoint (ASP) from the analog scaling block can vary from min. analog setpoint (ASPmin) to a max. analog setpoint (ASPmax) as shown in P0757 (ADC scaling).

The largest magnitude (value without sign) of ASPmin and ASPmax defines the scaling of 16384.

By associating parameter r0755 with an internal value (e.g. frequency setpoint), a scaled value is calculated internally by the MM4. The frequency value is calculated using the following equation:



$$r0755[Hz] = \frac{r0755[Hex]}{4000[Hex]} \cdot P2000 \cdot \frac{\max(|ASP_{max}|, |ASP_{min}|)}{100\%}$$

Index:

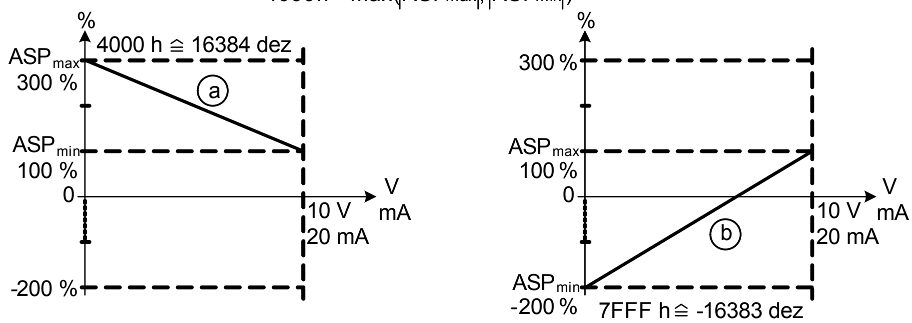
r0755[0] : Analog input 1 (ADC 1)
r0755[1] : Analog input 2 (ADC 2)

Example:

Case a:
- ASPmin = 300 %, ASPmax = 100 % then 16384 represents 300 %.
- This parameter will vary from 5461 to 16384.

Case b:
- ASPmin = -200 %, ASPmax = 100 % then 16384 represents 200 %.
- This parameter will vary from -16384 to +8192.

$$4000h = \max(|ASP_{max}|, |ASP_{min}|)$$



Note:
- This value is used as an input to analog BICO connectors.
- ASPmax represents the highest analog setpoint (this may be at 10 V).
- ASPmin represents the lowest analog setpoint (this may be at 0 V).

Details:

See parameters P0757 to P0760 (ADC scaling)

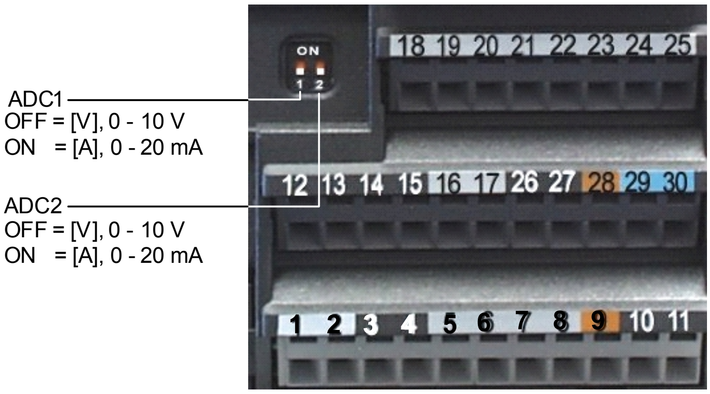
P0756[2] Type of ADC

				Level
CStat: CT	Datatype: U16	Unit: -	Min: 0	2
P-Group: TERMINAL	Active: first confirm	QuickComm.: No	Def: 0	
			Max: 4	

Defines type of analog input and also enables analog input monitoring.

To switch over from voltage to current analog input it is not sufficient to merely modify parameter P0756. Rather, the DIPs on the terminal board must also be set to the correct position. The DIP settings are as follows:
- OFF = voltage input (10 V)
- ON = current input (20 mA)

Allocation of DIPs to analog inputs is as follows:
- DIP on left (DIP 1) = Analog input 1
- DIP on right (DIP 2) = Analog input 2



Possible Settings:

- 0 Unipolar voltage input (0 to +10 V)
- 1 Unipolar voltage input with monitoring (0 to 10 V)
- 2 Unipolar current input (0 to 20 mA)
- 3 Unipolar current input with monitoring (0 to 20 mA)
- 4 Bipolar voltage input (-10 V to +10 V)

Index:

P0756[0] : Analog input 1 (ADC 1)
P0756[1] : Analog input 2 (ADC 2)

Notice:

When monitoring is enabled and a deadband defined (P0761), a fault condition will be generated (F0080) if the analog input voltage falls below 50 % of the deadband voltage.

On account of h/w restirction it is not possible to select the bipolar voltage (see Enum declaration) for analog input 2 (P0756[1] = 4).

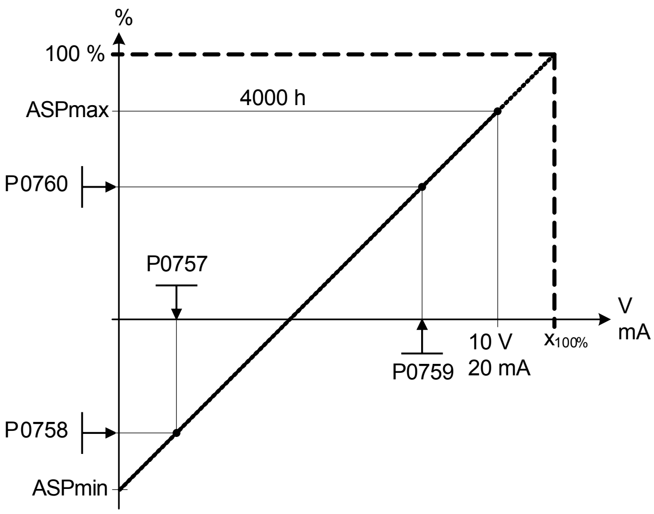
Details:

See P0757 to P0760 (ADC scaling).

P0757[2]	**Value x1 of ADC scaling [V / mA]**				**Min:**	-20	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -		**Def:**	0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No		**Max:**	20	

Parameters P0757 - P0760 configure the input scaling as shown in the diagram:

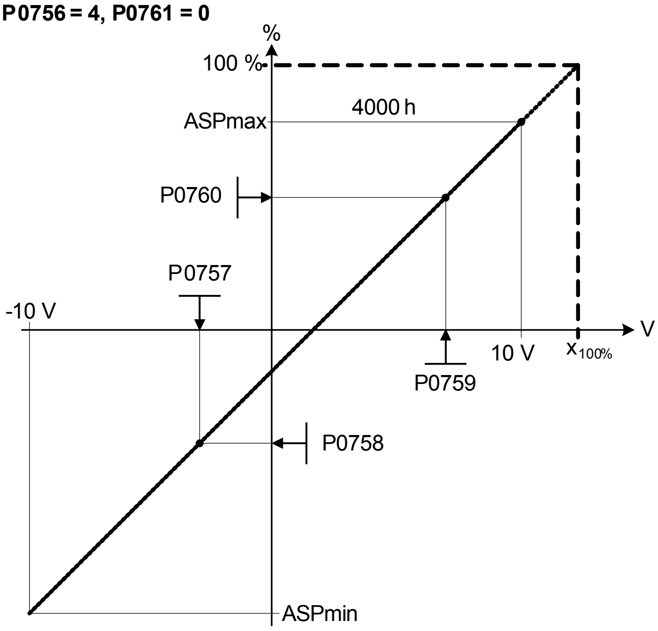
P0756 = 0 ... 3, P0761 = 0



Where:

- Analog setpoints represent a [%] of the normalized frequency in P2000.
- Analog setpoints may be larger than 100 %.
- ASPmax represents highest analog setpoint (this may be at 10 V or 20 mA).
- ASPmin represents lowest analog setpoint (this may be at 0 V or 20 mA).
- Default values provide a scaling of 0 V or 0 mA = 0 %, and 10 V or 20 mA = 100 %.

P0756 = 4, P0761 = 0



Index:

P0757[0] : Analog input 1 (ADC 1)
P0757[1] : Analog input 2 (ADC 2)

Note:

The ADC-linear characteristic is described by 4 coordinates, based on a two-point equation:

$$\frac{y - P0758}{x - P0757} = \frac{P0760 - P0758}{P0759 - P0757}$$

For calculations the point-gradient form (offset and gradient) is more advantageous:

$$y = m \cdot x + y_0$$

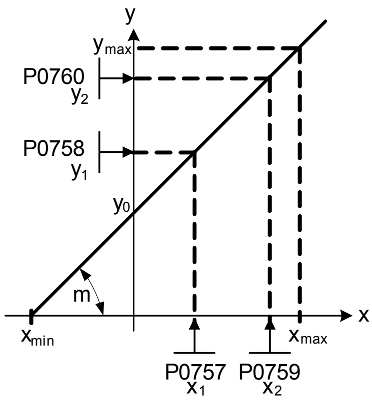
The transformation between these two forms is given by:

$$m = \frac{P0760 - P0758}{P0759 - P0757} \qquad y_0 = \frac{P0758 \cdot P0759 - P0757 \cdot P0760}{P0759 - P0757}$$

For scaling of the input the value of y_max and x_min has to be determined. This is done by the following equations:

$$x_{min} = \frac{P0760 \cdot P0757 - P0758 \cdot P0759}{P0760 - P0758}$$

$$y_{max} = (x_{max} - x_{min}) \cdot \frac{P0760 - P0758}{P0759 - P0757}$$



Notice:

The value x2 of ADC scaling P0759 must be greater than the value x1 of ADC scaling P0757.

P0758[2] Value y1 of ADC scaling

CStat: CUT	**Datatype:** Float	**Unit:** %	**Min:** -99999.9	Level
P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Def:** 0.0	**2**
			Max: 99999.9	

Sets value of Y1 in [%] as described in P0757 (ADC scaling)

Index:

P0758[0] : Analog input 1 (ADC 1)
P0758[1] : Analog input 2 (ADC 2)

Dependency:

Affects P2000 to P2003 (reference frequency, voltage, current or torque) depending on which setpoint is to be generated.

P0759[2]	**Value x2 of ADC scaling [V / mA]**			**Min:** -20	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 10	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 20	

Sets value of X2 as described in P0757 (ADC scaling).

Index:

P0759[0] : Analog input 1 (ADC 1)
P0759[1] : Analog input 2 (ADC 2)

Notice:

The value x2 of ADC scaling P0759 must be greater than the value x1 of ADC scaling P0757.

P0760[2]	**Value y2 of ADC scaling**			**Min:** -99999.9	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 100.0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 99999.9	

Sets value of Y2 in [%] as described in P0757 (ADC scaling).

Index:

P0760[0] : Analog input 1 (ADC 1)
P0760[1] : Analog input 2 (ADC 2)

Dependency:

Affects P2000 to P2003 (reference frequency, voltage, current or torque) depending on which setpoint is to be generated.

P0761[2]	**Width of ADC deadband [V / mA]**			**Min:** 0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 20	

Defines width of deadband on analog input. The diagrams below explain its use.

Index:

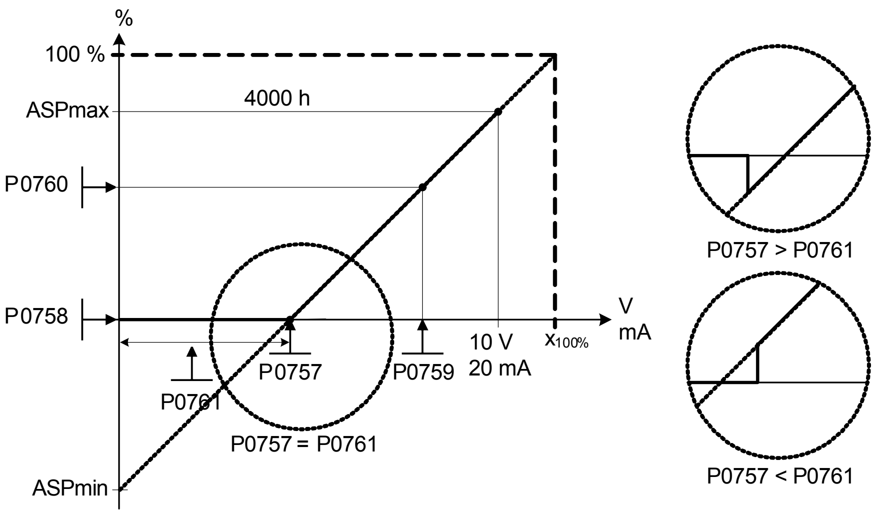
P0761[0] : Analog input 1 (ADC 1)
P0761[1] : Analog input 2 (ADC 2)

Example:

The below example produces a 2 to 10 V analog input 0 to 50 Hz (ADC value 2 to 10 V, 0 to 50 Hz):

- P2000 = 50 Hz
- P0759 = 8 V P0760 = 75 %
- P0757 = 2 V P0758 = 0 %
- P0761 = 2 V
- P0756 = 0 or 1

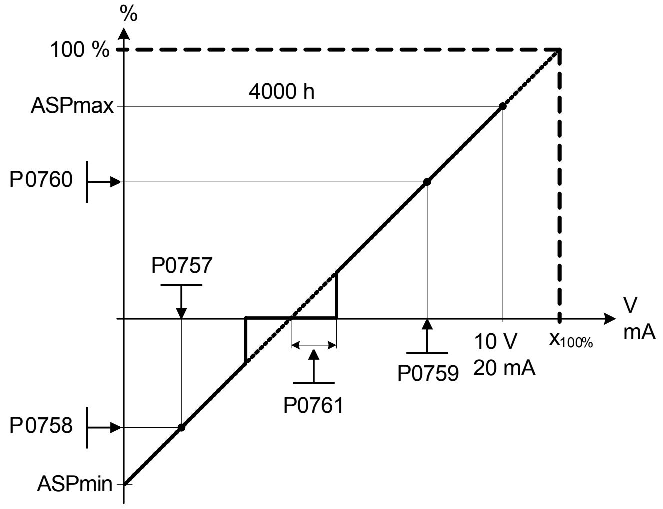
P0761 > 0 and (0 < P0758 < P0760 or 0 > P0758 > P0760)



The below example produces a 0 to 10 V analog input (-50 to +50 Hz) with center zero and a "holding point" 0.2 V wide (0.1 V to each side of center, ADC value 0 to 10 V, -50 to +50 Hz):

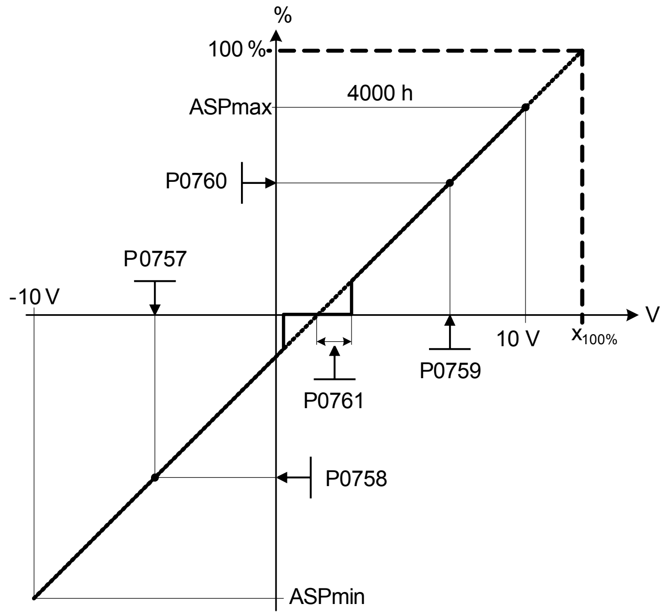
- P2000 = 50 Hz
- P0759 = 8 V P0760 = 75 %
- P0757 = 2 V P0758 = -75 %
- P0761 = 0.1 V
- P0756 = 0 or 1

P0761 > 0 and P0758 < 0 < P0760



The below example produces a -10 to +10 V analog input (-50 to +50 Hz) with center zero and a "holding point" 0.2 V wide (0.1 V to each side of center).

P0756 = 4 and P0761 > 0 and P0758 < 0 < P0760



Note:

P0761[x] = 0 : No deadband active.

Deadband starts from 0 V to value of P0761, if both values of P0758 and P0760 (y coordinates of ADC scaling) are positive or negative respectively. However, deadband is active in both directions from point of intersection (x axis with ADC scaling curve), if sign of P0758 and P0760 are opposite.

Min. frequency P1080 should be zero when using center zero setup. There is no hysteresis at the end of the deadband.

P0762[2]	**Delay for loss of signal action**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 10	**3**
	P-Group: TERMINAL	**Active:** Immediately	**QuickComm.:** No	**Max:** 10000	

Defines time delay between loss of analog setpoint and appearance of fault code F0080.

Index:

P0762[0] : Analog input 1 (ADC 1)
P0762[1] : Analog input 2 (ADC 2)

Note:

Expert users can choose the desired reaction to F0080 (default is OFF2).

3.12 Analog outputs

r0770	**Number of DACs**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TERMINAL			**Max:** -	

Displays number of analog outputs available.

P0771[2]	**CI: DAC**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 21:0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

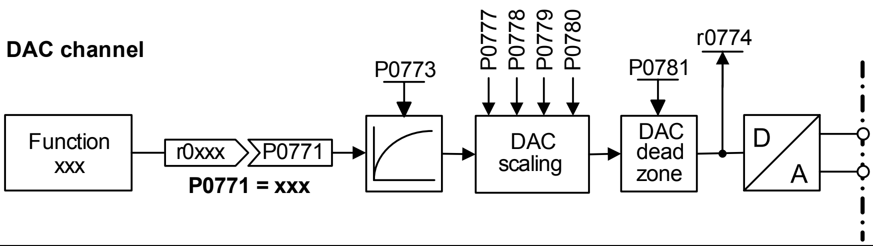
Defines function of the 0 - 20 mA analog output.

Index:

P0771[0] : Analog output 1 (DAC 1)
P0771[1] : Analog output 2 (DAC 2)

Common Settings:

21 CO: Act. frequency (scaled to P2000)
24 CO: Act. output frequency (scaled to P2000)
25 CO: Act. output voltage (scaled to P2001)
26 CO: Act. filtered DC-link volt. (scaled to P2001)
27 CO: Act. output current (scaled to P2002)



P0773[2]	**Smooth time DAC**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 2	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 1000	

Defines smoothing time [ms] for analog output signal. This parameter enables smoothing for DAC using a PT1 filter.

Index:

P0773[0] : Analog output 1 (DAC 1)
P0773[1] : Analog output 2 (DAC 2)

Dependency:

P0773 = 0: Deactivates filter.

r0774[2]	**Act. DAC value [mA]**			**Min:** -	Level
		Datatype: Float	**Unit:** -	**Def:** -	**2**
	P-Group: TERMINAL			**Max:** -	

Shows value of analog output in [mA] after filtering and scaling.

Index:

r0774[0] : Analog output 1 (DAC 1)
r0774[1] : Analog output 2 (DAC 2)

P0775[2]	**Permit absolute value**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 1	

Decides if the absolute value of the analog output is used. If enabled, this parameter will take the absolute value of the value to be outputed. If the value was originally negative then the corresponding bit in R0783 is set, otherwise it is cleared.

Possible Settings:

0 OFF
1 ON

Index:

P0775[0] : Analog output 1 (DAC 1)
P0775[1] : Analog output 2 (DAC 2)

P0776[2]	**Type of DAC**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 1	

Defines type of analog output.

Possible Settings:

0 Current output
1 Voltage output

Index:

P0776[0] : Analog output 1 (DAC 1)
P0776[1] : Analog output 2 (DAC 2)

Note:

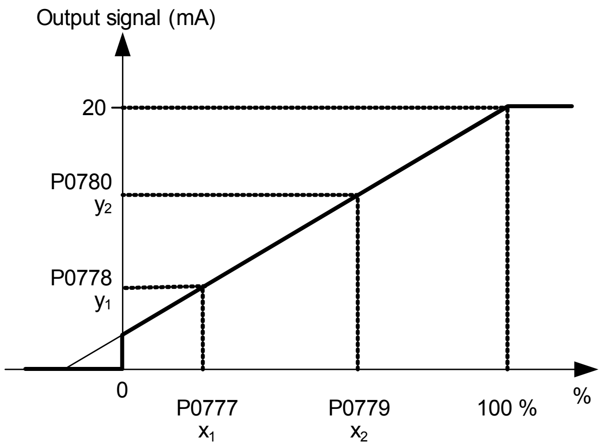
The analog output is designed as a current output with a range of 0...20 mA.

For a voltage output with a range of 0...10 V an external resistor of 500 Ohms has to be connected at the terminals (12/13 or 26/27).

P0777[2]	**Value x1 of DAC scaling**			**Min:** -99999.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 0.0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 99999.0	

Defines x1 output characteristic in [%]. Scaling block is responsible for adjustment of output value defined in P0771 (DAC connector input).

Parameters of DAC scaling block (P0777 ... P0781) work as follows:



Where:
Points P1 (x1, y1) and P2 (x2, y2) can be chosen freely.

Index:

P0777[0] : Analog output 1 (DAC 1)
P0777[1] : Analog output 2 (DAC 2)

Example:

The default values of the scaling block provides a scaling of:
P1: 0.0 % = 0 mA
P2: 100.0 % = 20 mA

Dependency:

Affects P2000 to P2003 (referency frequency, voltage, current or torque) depending on which setpoint is to be generated.

Note:

The DAC-linear characteristic is described by 4 coordinates, based on a two-point equation:

$$\frac{y - P0778}{x - P0777} = \frac{P0780 - P0778}{P0779 - P0777}$$

For calculations the point-gradient form (offset and gradient) is more advantageous:

$$y = m \cdot x + y_0$$

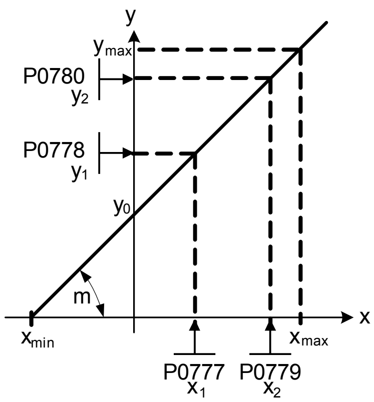
The transformation between these two forms is given by:

$$m = \frac{P0780 - P0778}{P0779 - P0777} \qquad y_0 = \frac{P0778 \cdot P0779 - P0777 \cdot P0780}{P0779 - P0777} \leq |\,200\,\%\,|$$

For scaling of the input the value of y_max and x_min has to be determined. This is done by the following equations:

$$x_{min} = \frac{P0780 \cdot P0777 - P0778 \cdot P0779}{P0780 - P0778}$$

$$y_{max} = (x_{max} - x_{min}) \cdot \frac{P0780 - P0778}{P0779 - P0777}$$



P0778[2]	**Value y1 of DAC scaling**			**Min:** 0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 20	

Defines y1 of output characteristic.

Index:

P0778[0] : Analog output 1 (DAC 1)
P0778[1] : Analog output 2 (DAC 2)

P0779[2]	**Value x2 of DAC scaling**			**Min:** -99999.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 100.0	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 99999.0	

Defines x2 of output characteristic in [%].

Index:

P0779[0] : Analog output 1 (DAC 1)
P0779[1] : Analog output 2 (DAC 2)

Dependency:

Affects P2000 to P2003 (referency frequency, voltage, current or torque) depending on which setpoint is to be generated.

P0780[2]	**Value y2 of DAC scaling**			**Min:** 0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 20	**2**
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 20	

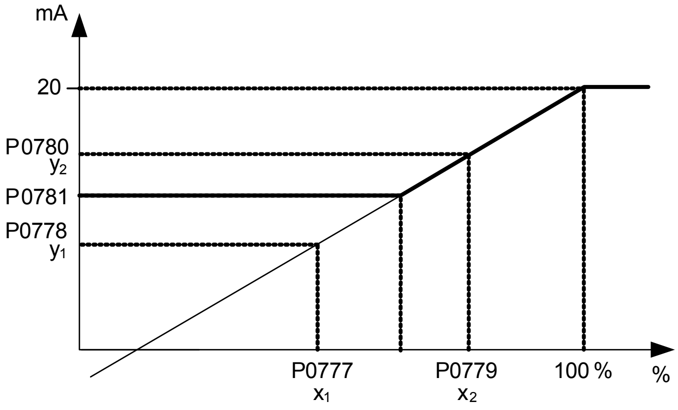
Defines y2 of output characteristic.

Index:

P0780[0] : Analog output 1 (DAC 1)
P0780[1] : Analog output 2 (DAC 2)

P0781[2]	**Width of DAC deadband**		**Min:** 0	Level **2**
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 0
	P-Group: TERMINAL	**Active:** first confirm	**QuickComm.:** No	**Max:** 20

Sets width of dead-band in [mA] for analog output.



Index:

P0781[0] : Analog output 1 (DAC 1)
P0781[1] : Analog output 2 (DAC 2)

r0785	**CO/BO: Status word of DAC**		**Min:** -	Level **2**
		Datatype: U16	**Unit:** -	**Def:** -
	P-Group: TERMINAL			**Max:** -

Displays status of analog output. Bit 0 indicates that the value of analog output 1 is negative. Bit 1 indicates that the value of analog output 2 is negative.

Bitfields:

```
Bit00   Analog output 1 -ve                    0  NO        1  YES
Bit01   Analog output 2 -ve                    0  NO        1  YES
```

3.13 Parameter / command / drive data set

P0800[3]	**BI: Download parameter set 0**				**Min:** 0:0	Level
	CStat: CT		**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: COMMANDS		**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines source of command to start download of parameter set 0 from attached AOP.

Index:

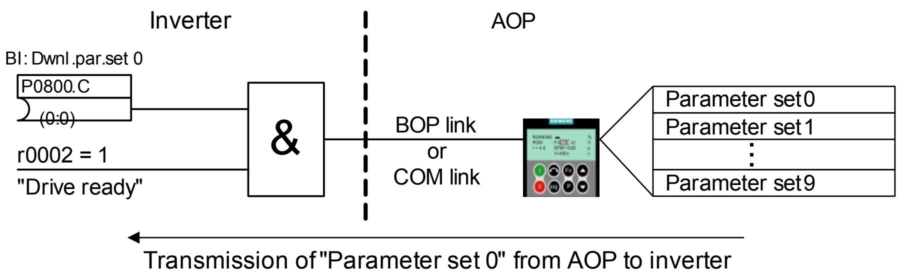
P0800[0] : 1st. Command data set (CDS)
P0800[1] : 2nd. Command data set (CDS)
P0800[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)

Dependency:

1. The parameter set 0 can only be downloaded in conjunction with the AOP
2. Establish communications between the frequency inverter and AOP
3. The frequency inverter must be selected using the AOP if the AOP is connected at the COM link interface (RS485)
4. Select the frequency inverter state "Ready" (r0002 = 1)
5. Signal from P0800:
   0 = Do not download.
   1 = Start to download parameter set 0 from the AOP.



P0801[3]	**BI: Download parameter set 1**				**Min:** 0:0	Level
	CStat: CT		**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: COMMANDS		**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines sources of command to start download of parameter set 1 from attached AOP.

Index:

P0801[0] : 1st. Command data set (CDS)
P0801[1] : 2nd. Command data set (CDS)
P0801[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)

Note:

See parameter P0800

P0809[3] Copy command data set (CDS)

				Min: 0	Level
CStat: CT	**Datatype:** U16	**Unit:** -		**Def:** 0	**2**
P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No		**Max:** 2	

Calls "copy Command Data Set (CDS)" function.
The list of all Command Data Sets (CDS) are shown in the opening instructions of the Parameter List (PLI).

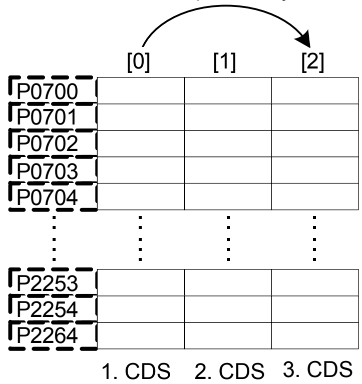
Index:

P0809[0] : Copy from CDS
P0809[1] : Copy to CDS
P0809[2] : Start copy

Example:

Copying of all values from CDS1 to CDS3 can be accomplished by the following procedure:

P0809[0] = 0 1. CDS
P0809[1] = 2 3. CDS
P0809[2] = 1 Start copy



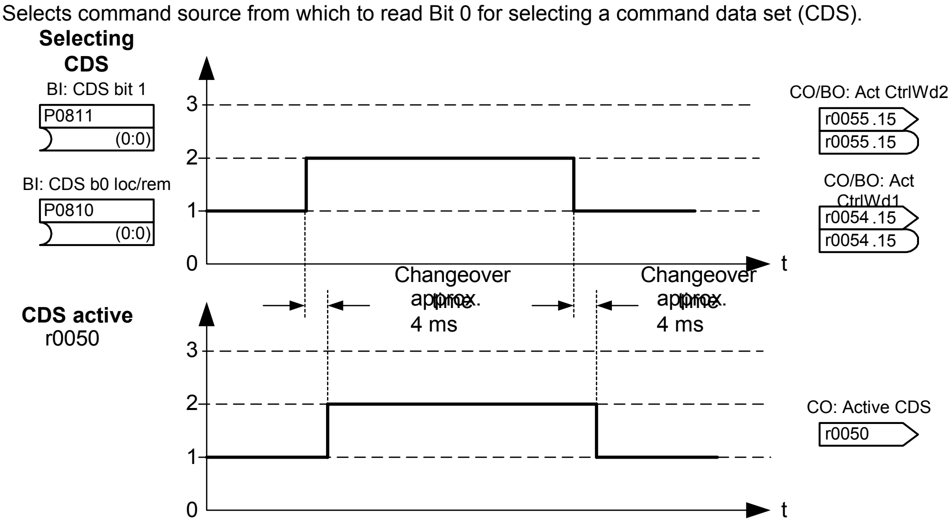
Note:

Start value in index 2 is automatically reset to "0" after execution of function.

P0810 BI: CDS bit 0 (Local / Remote)

				Min: 0:0	Level
CStat: CUT	**Datatype:** U32	**Unit:** -		**Def:** 0:0	**2**
P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No		**Max:** 4095:0	

Selects command source from which to read Bit 0 for selecting a command data set (CDS).



The actual active command data set (CDS) is displayed in parameter r0050.

	selected CDS		active CDS
	r0055 Bit15	r0054 Bit15	r0050
1. CDS	0	0	0
2. CDS	0	1	1
3. CDS	1	0	2
3. CDS	1	1	2

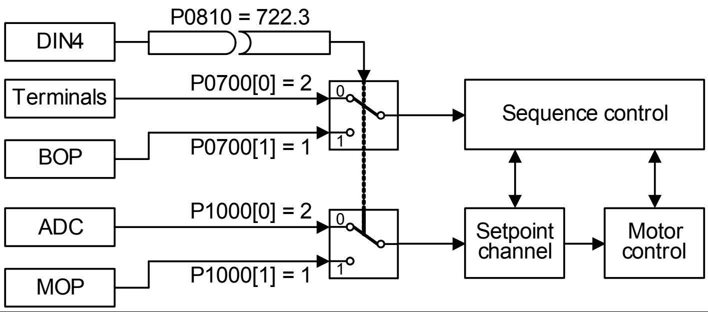
Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)

Example:

Typical procedure for CDS switch-over:
- CDS1: Command source via terminal and setpoint source via analog input (ADC)
- CDS2: Command source via BOP and setpoint source via MOP
- CDS switch-over takes place via digital input 4 (DIN 4)

Steps:
1. Perform commissioning with CDS1 parameters (P0700[0] = 2 and P1000[0] = 2)
2. Connect P0810 (P0811 if necessary) with the source of CDS switch-over (P0704[0] = 99, P0810 = 722.3)
3. Copy CDS1 to CDS2 (P0809[0] = 0, P0809[1] = 1, P0809[2] = 2)
4. Change CDS2 parameter as required (set parameters for CDS2 [P0700=1 and P1000=1])



Note:

P0811 is also relevant for command data set (CDS) set selection.

P0811 BI: CDS bit 1

CStat: CUT	**Datatype:** U32	**Unit:** -	**Min:** 0:0 / **Def:** 0:0 / **Max:** 4095:0
P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	Level **2**

Selects command source from which to read Bit 1 for selecting a command data set (see P0810).

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)

Note:

P0810 is also relevant for command data set (CDS) selection.

P0819[3]	**Copy drive data set (DDS)**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 2	

Calls "Copy Drive Data Set (DDS)" function.

The list of all Drive Data Sets (DDS) are shown in the opening instructions of the Parameter List (PLI).

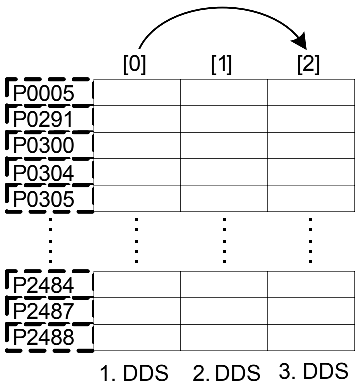
Index:

P0819[0] : Copy from DDS
P0819[1] : Copy to DDS
P0819[2] : Start copy

Example:

Copying of all values from DDS1 to DDS3 can be accomplished by the following procedure:

P0819[0] = 0 1. DDS
P0819[1] = 2 3. DDS
P0819[2] = 1 Start copy

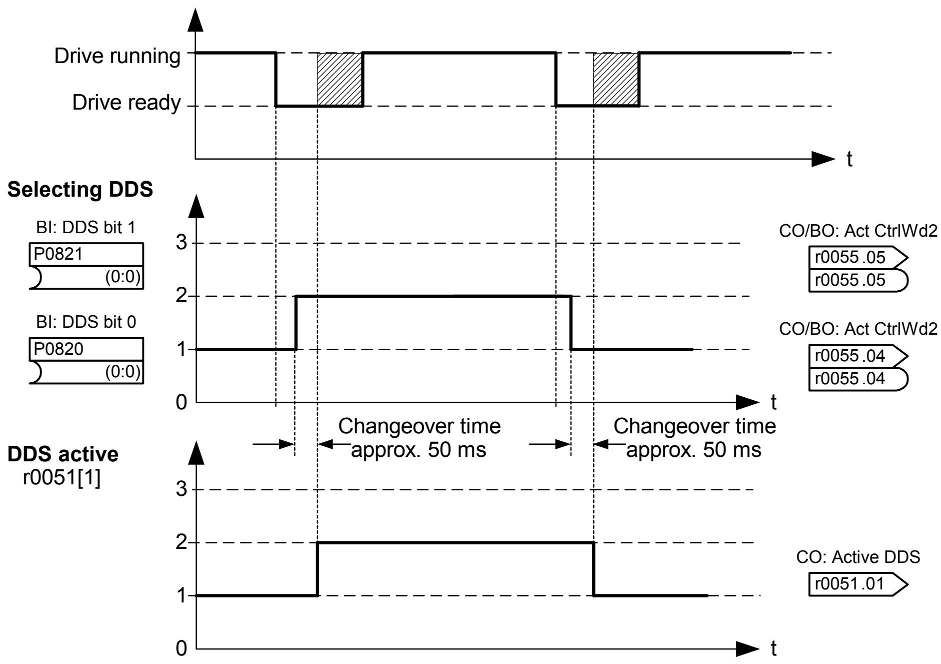


Note:

Start value in index 2 is automatically reset to "0" after execution of function.

P0820	**BI: DDS bit 0**			**Min:** 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4095:0	

Selects command source from which to read Bit 0 for selecting a drive data set (DDS).



The actual active drive data set (DDS) is displayed in parameter r0051[1].

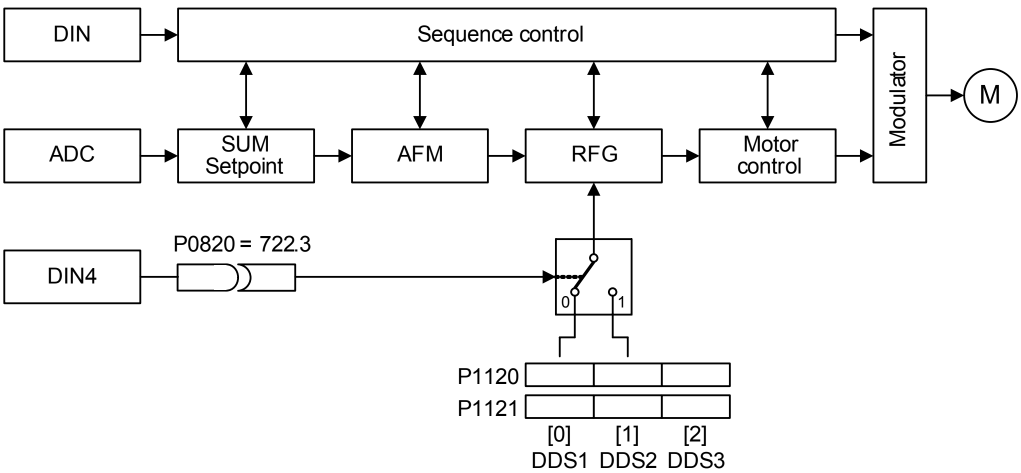
	selected DDS			active DDS
	r0055 Bit05	r0055 Bit04	r0051 [0]	r0051 [1]
1. DDS	0	0	0	0
2. DDS	0	1	1	1
3. DDS	1	0	2	2
3. DDS	1	1	2	2

Common Settings:

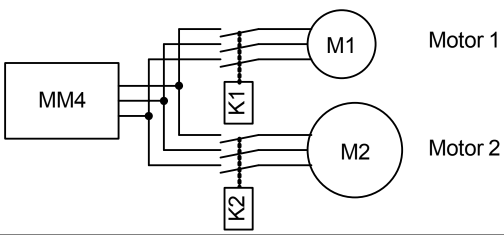
722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)

Example:

a) Commissioning procedure with one motor:
- Apply commissioning to DDS1
- Connect P0820 (P0821 if necessary) with DDS source (i.e. via DIN 4: P0704[0] = 99, P0820 = 722.3)
- Copy DDS1 to DDS2 (P0819[0] = 0, P0819[1] = 1, P0819[2] = 2)
- Adapt DDS2 parameters (e.g. Ramp-up time P1120[1] and Ramp-down time P1121[1])



b) Commissioning procedure with two motors (Motor 1, Motor 2):
- Commission Motor 1; Adapt all other DDS1 parameters (as required)
- Connect P0820 (P0821 if necessary) with DDS source (i.e. via DIN 4: P0704[0] = 99, P0820 = 722.3)
- Switch-over to DDS2 (check it via r0051)
- Commission Motor 2; Adapt all other DDS2 parameters (as required)



Note:

P0821 is also relevant for drive data set (DDS) selection.

P0821	**BI: DDS bit 1**			**Min:**	0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:**	0:0	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:**	4095:0	

Selects command source from which Bit 1 for selecting a drive data set is to be read in (see parameter P0820).

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)

Note:

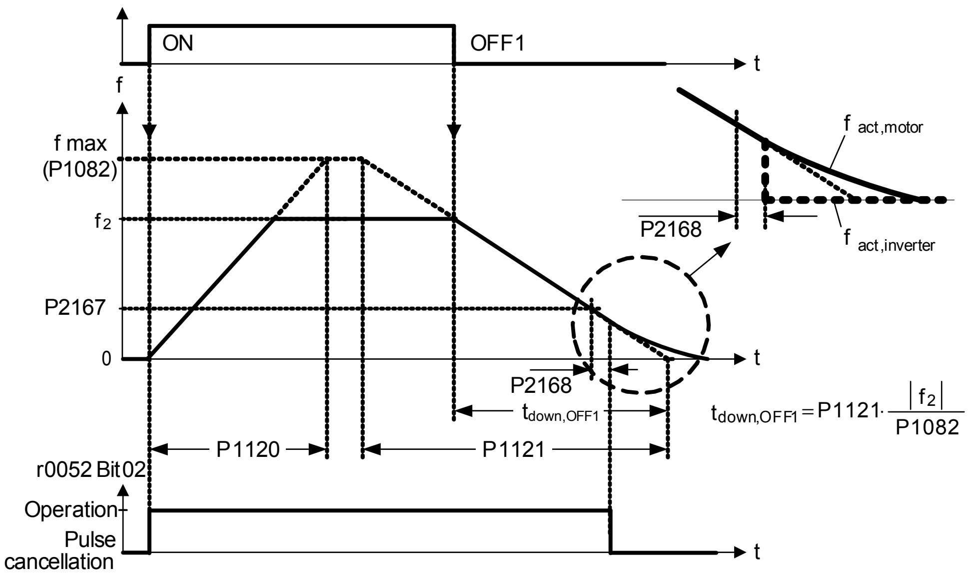
P0820 is also relevant for drive data set (DDS) selection.

3.14 BICO command parameters

P0840[3]	**BI: ON/OFF1**			**Min:**	0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:**	722:0	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:**	4000:0	

Allows ON/OFF1 command source to be selected using BICO.

The first three digits describe the parameter number of the command source; the last digit denotes the bit setting for that parameter. The default setting (ON right) is digital input 1 (722.0). Alternative source possible only when function of digital input 1 is changed (via P0701) before changing value of P0840.



Index:

P0840[0] : 1st. Command data set (CDS)
P0840[1] : 2nd. Command data set (CDS)
P0840[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)
19.0 = ON/OFF1 via BOP

Dependency:

Active only when P0719 < 10. See parameter P0719 (Selection of command/setpoint source).

Note:

- OFF1 means a ramp stop down to 0 using P1121.
- OFF1 is low active.
- For the priority of all soft commands, the following applies: OFF2, OFF3, OFF1

P0842[3]	**BI: ON reverse/OFF1**				**Min:**	0:0	Level
	CStat:	CT	**Datatype:** U32	**Unit:** -	**Def:**	0:0	**3**
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:**	4000:0	

Allows ON/OFF1 reverse command source to be selected using BICO.

Normally in this case at a positive frequency setpoint, it is getting approached ccw (negative frequency setpoint) The first three digits describe the parameter number of the command source and the last digit denotes the bit setting for that parameter.

Index:

P0842[0] : 1st. Command data set (CDS)
P0842[1] : 2nd. Command data set (CDS)
P0842[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)
19.0 = ON/OFF1 via BOP

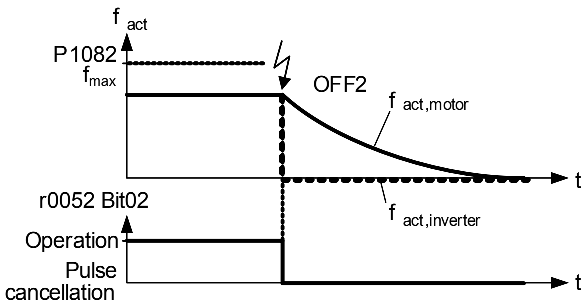
Details:

See parameter P0840.

P0844[3]	**BI: 1. OFF2**				**Min:**	0:0	Level
	CStat:	CT	**Datatype:** U32	**Unit:** -	**Def:**	1:0	**3**
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:**	4000:0	

Defines first source of OFF2.

The first three digits describe the parameter number of the command source and the last digit denotes the bit setting for that parameter. If one of the digital inputs is selected for OFF2, the inverter will not run unless the digital input is active.



Index:

P0844[0] : 1st. Command data set (CDS)
P0844[1] : 2nd. Command data set (CDS)
P0844[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)
19.0 = ON/OFF1 via BOP
19.1 = OFF2: Electrical stop via BOP

Dependency:

Active only when P0719 < 10. See parameter P0719 (Selection of command/setpoint source).

Note:

- OFF2 means an immediate pulse inhibit; the motor coasts down.
- OFF2 is low active.
- The following applies for the priority of all of the OFF commands: OFF2, OFF3, OFF1

P0845[3]	**BI: 2. OFF2**				**Min:**	0:0	Level
	CStat:	CT	**Datatype:** U32	**Unit:** -	**Def:**	19:1	**3**
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:**	4000:0	

Defines second source of OFF2.
The first three digits describe the parameter number of the command source and the last digit denotes the bit setting for that parameter. If one of the digital inputs is selected for OFF2, the inverter will not run unless the digital input is active.

Index:

P0845[0] : 1st. Command data set (CDS)
P0845[1] : 2nd. Command data set (CDS)
P0845[2] : 3rd. Command data set (CDS)

Common Settings:

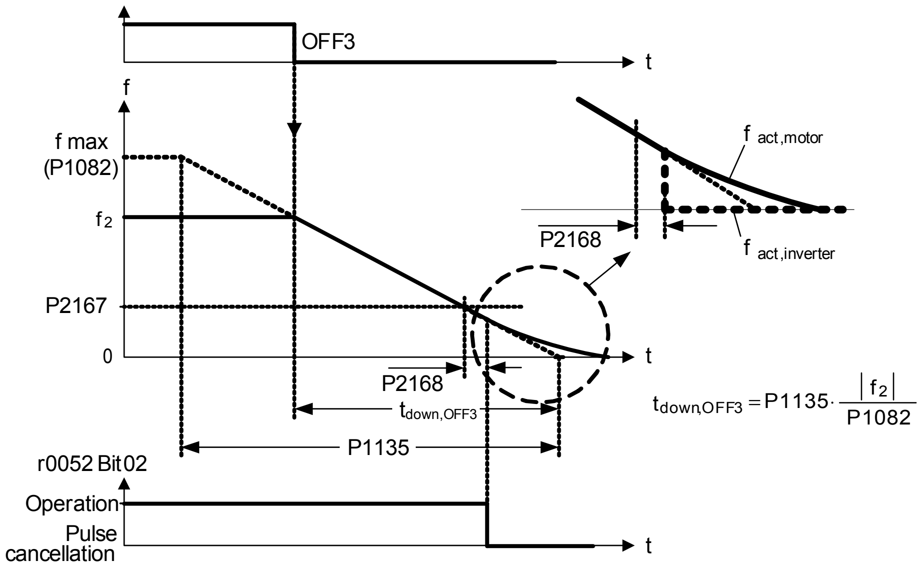
722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)
19.0 = ON/OFF1 via BOP

Details:

See parameter P0844.

P0848[3]	**BI: 1. OFF3**				**Min:**	0:0	Level
	CStat:	CT	**Datatype:** U32	**Unit:** -	**Def:**	1:0	**3**
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:**	4000:0	

Defines first source of OFF3.
The first three digits describe the parameter number of the command source and the last digit denotes the bit setting for that parameter. If one of the digital inputs is selected for OFF3, the inverter will not run unless the digital input is active.



Index:

P0848[0] : 1st. Command data set (CDS)
P0848[1] : 2nd. Command data set (CDS)
P0848[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)
19.0 = ON/OFF1 via BOP

Dependency:

Active only when P0719 < 10. See parameter P0719 (Selection of command/setpoint source).

Note:

- OFF3 means fast ramp-down to 0 Hz through P1135.
- OFF3 is low-active.
- Priority of all OFF commands: OFF2, OFF3, OFF1

P0849[3]	**BI: 2. OFF3**				**Min:** 0:0	Level
	CStat: CT		**Datatype:** U32	**Unit:** -	**Def:** 1:0	**3**
	P-Group: COMMANDS		**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines second source of OFF3.

The first three digits describe the parameter number of the command source and the last digit denotes the bit setting for that parameter. If one of the digital inputs is selected for OFF3, the inverter will not run unless the digital input is active.

Index:

P0849[0] : 1st. Command data set (CDS)
P0849[1] : 2nd. Command data set (CDS)
P0849[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)
19.0 = ON/OFF1 via BOP

Dependency:

In contrast to P0848 (first source of OFF3), this parameter is always active, independent of P0719 (selection of command and frequency setpoint).

Details:

See parameter P0848.

P0852[3]	**BI: Pulse enabling**				**Min:** 0:0	Level
	CStat: CT		**Datatype:** U32	**Unit:** -	**Def:** 1:0	**3**
	P-Group: COMMANDS		**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines source of pulse enable/disable signal.

Index:

P0852[0] : 1st. Command data set (CDS)
P0852[1] : 2nd. Command data set (CDS)
P0852[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)

Dependency:

Active only when P0719 < 10. See parameter P0719 (Selection of command/setpoint source).

3.15 Communication parameters

P0918	**CB address**				**Min:** 0	Level
	CStat: CT		**Datatype:** U16	**Unit:** -	**Def:** 3	**2**
	P-Group: COMM		**Active:** first confirm	**QuickComm.:** No	**Max:** 65535	

Defines address of CB (communication board) or address of the other option modules.

There are two ways to set the bus address:
- via DIP switches on the PROFIBUS module
- via a user-entered value

Note:

Possible PROFIBUS settings:
- 1 ... 125
- 0, 126, 127 are not allowed

The following applies when a PROFIBUS module is used:
- DIP switch = 0 Address defined in P0918 (CB address) is valid
- DIP switch not = 0 DIP switch setting has priority and P0918 indicates DIP switch setting.

P0927	**Parameter changeable via**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 15	**2**
	P-Group: COMM	**Active:** first confirm	**QuickComm.:** No	**Max:** 15	

Specifies the interfaces which can be used to change parameters.

This parameter allows the user to easily protect the inverter from unauthorized modification of parameters.
Annotation: Parameter P0927 is not password protected.

Bitfields:

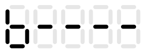
Bit00	PROFIBUS / CB	0 NO	1 YES
Bit01	BOP	0 NO	1 YES
Bit02	USS on BOP link	0 NO	1 YES
Bit03	USS on COM link	0 NO	1 YES

Example:

Bits 0, 1, 2 and 3 set:
The default setting allows parameters to be changed via any interface. If all bits are set, the parameter is displayed on BOP as follows:

BOP:
P0927 

Bits 0, 1, 2 and 3 reset:
This setting allows no parameters to be modified via any interface with the exception of P0003 and P0927. If all bits are reset, the parameter is displayed on BOP as follows:

BOP:
P0927 

Details:

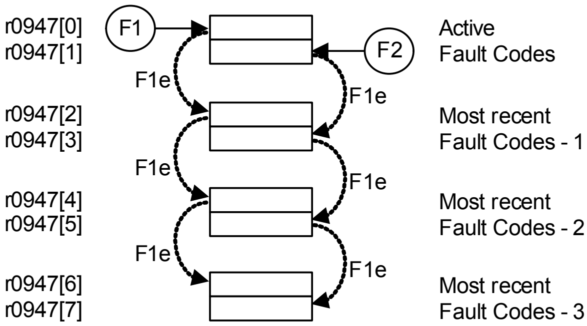
The seven-segment display is explained in the "Introduction to MICROMASTER System Parameters" in this handbook.

r0947[8]	**CO: Last fault code**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**2**
	P-Group: ALARMS			**Max:** -	

Displays fault history according to the diagram below
where:

- "F1" is the first active fault (not yet acknowledged).
- "F2" is the second active fault (not yet acknowledged).
- "F1e" is the occurrence of the fault acknowledgement for F1 & F2.

This moves the value in the 2 indices down to the next pair of indices, where they are stored. Indices 0 & 1 contain the active faults. When faults are acknowledged, indices 0 & 1 are reset to 0.



Index:

r0947[0] : Recent fault trip --, fault 1
r0947[1] : Recent fault trip --, fault 2
r0947[2] : Recent fault trip -1, fault 3
r0947[3] : Recent fault trip -1, fault 4
r0947[4] : Recent fault trip -2, fault 5
r0947[5] : Recent fault trip -2, fault 6
r0947[6] : Recent fault trip -3, fault 7
r0947[7] : Recent fault trip -3, fault 8

Example:

If the inverter trips on undervoltage and then receives an external trip before the undervoltage is acknowledged, you will obtain:

- r0947[0] = 3 Undervoltage (F0003)
- r0947[1] = 85 External trip (F0085)

Whenever a fault in index 0 is acknowledged (F1e), the fault history shifts as indicated in the diagram above.

Dependency:

Index 1 used only if second fault occurs before first fault is acknowledged.

Details:

See "Faults and Warnings"

r0948[12]	CO: Fault time			Min: -	Level
		Datatype: U16	Unit: -	Def: -	3
	P-Group: ALARMS			Max: -	

Time stamp to indicate when the fault has occurred.

Index:

r0948[0] : Recent fault trip --, time stamp
r0948[1] : Recent fault trip --, time stamp
r0948[2] : Recent fault trip --, time stamp
r0948[3] : Recent fault trip -1, time stamp
r0948[4] : Recent fault trip -1, time stamp
r0948[5] : Recent fault trip -1, time stamp
r0948[6] : Recent fault trip -2, time stamp
r0948[7] : Recent fault trip -2, time stamp
r0948[8] : Recent fault trip -2, time stamp
r0948[9] : Recent fault trip -3, time stamp
r0948[10] : Recent fault trip -3, time stamp
r0948[11] : Recent fault trip -3, time stamp

Details:

Parameter r2114 (runtime counter) is a possible source of the time stamp. When using the runtime counter, the time is entered into the first two indices of the fault trip (shutdown) essentially the same as for r2114.

Time stamp when using r2114 (Refer to parameter r2114):

r0948[0] : Last fault trip --, system time, seconds, upper word
r0948[1] : Last fault trip --, system time, seconds, lower word
r0948[2] : 0
r0948[3] : Last fault trip --, system time, seconds, upper word
r0948[4] : Last fault trip --, system time, seconds, lower word
r0948[5] : 0
r0948[6] : Last fault trip --, system time, seconds, upper word
r0948[7] : Last fault trip --, system time, seconds, lower word
r0948[8] : 0
r0948[9] : Last fault trip --, system time, seconds, upper word
r0948[10] : Last fault trip --, system time, seconds, lower word
r0948[11] : 0

Parameter P2115 (AOP real-time clock) is an additional possible source of the time stamp. When using the real-time counter, instead of the system runtime r2114[0] and r2114[1], the value of the real-time clock P2115[0] to P2115[2] is read-in.

If the contents of parameter P2115 = 0, then the system assumes that there was no synchronization with the real time. In this case, if there is a fault, values are transferred from parameter r2114 into parameter P0948. If the contents of parameter P2115 are not equal to zero, then a synchronization with real time has taken place. In this case, if there is a fault, the values from parameter P2115 are transferred into parameter P0948.

Time stamp when using P2115 (Refer to parameter P2115 (AOP real-time clock)):

r0948[0] : Last fault trip --, fault time, seconds + minutes
r0948[1] : Last fault trip --, fault time, hours + days
r0948[2] : Last fault trip --, fault time, month + year
r0948[3] : Last fault trip -1, fault time, seconds + minutes
r0948[4] : Last fault trip -1, fault time, hours + days
r0948[5] : Last fault trip -1, fault time, month + year
r0948[6] : Last fault trip -2, fault time, seconds + minutes
r0948[7] : Last fault trip -2, fault time, hours + days
r0948[8] : Last fault trip -2, fault time, month + year
r0948[9] : Last fault trip -3, fault time, seconds + minutes
r0948[10] : Last fault trip -3, fault time, hours + days
r0948[11] : Last fault trip -3, fault time, month + year

r0949[8]	CO: Fault value			Min: -	Level
		Datatype: U16	Unit: -	Def: -	3
	P-Group: ALARMS			Max: -	

Displays drive fault values. It is for service purposes and indicate the type of fault reported. The values are listed in the code where faults are reported.

Index:

r0949[0] : Recent fault trip --, fault value 1
r0949[1] : Recent fault trip --, fault value 2
r0949[2] : Recent fault trip -1, fault value 3
r0949[3] : Recent fault trip -1, fault value 4
r0949[4] : Recent fault trip -2, fault value 5
r0949[5] : Recent fault trip -2, fault value 6
r0949[6] : Recent fault trip -3, fault value 7
r0949[7] : Recent fault trip -3, fault value 8

P0952	**Total number of faults**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: ALARMS	**Active:** first confirm	**QuickComm.:** No	**Max:** 8	

Displays number of faults stored in r0947 (last fault code).

Dependency:

Setting 0 resets fault history. (changing to 0 also resets parameter r0948 - fault time).

r0964[5]	**Firmware version data**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: COMM			**Max:** -	

Firmware version data.

Index:

r0964[0] : Company (Siemens = 42)
r0964[1] : Product type
r0964[2] : Firmware version
r0964[3] : Firmware date (year)
r0964[4] : Firmware date (day/month)

Example:

No.	Value	Meaning
r0964[0]	42	SIEMENS
r0964[1]	1001	MICROMASTER 420
	1002	MICROMASTER 440
	1003	MICRO- / COMBIMASTER 411
	1004	MICROMASTER 410
	1005	reserved
	1006	MICROMASTER 440 PX
	1007	MICROMASTER 430
r0964[2]	105	Firmware V1.05
r0964[3]	2001	27.10.2001
r0964[4]	2710	

r0965	**Profibus profile**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: COMM			**Max:** -	

Identification of profile number and version for PROFIDrive.

r0967	**Control word 1**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: COMM			**Max:** -	

Displays control word 1.

Bitfields:

```
Bit00   ON/OFF1                          0  NO        1  YES
Bit01   OFF2: Electrical stop            0  YES       1  NO
Bit02   OFF3: Fast stop                  0  YES       1  NO
Bit03   Pulses enabled                   0  NO        1  YES

Bit04   RFG enable                       0  NO        1  YES
Bit05   RFG start                        0  NO        1  YES
Bit06   Setpoint enable                  0  NO        1  YES
Bit07   Fault acknowledge                0  NO        1  YES

Bit08   JOG right                        0  NO        1  YES
Bit09   JOG left                         0  NO        1  YES
Bit10   Control from PLC                 0  NO        1  YES
Bit11   Reverse (setpoint inversion)     0  NO        1  YES

Bit13   Motor potentiometer MOP up       0  NO        1  YES
Bit14   Motor potentiometer MOP down     0  NO        1  YES
Bit15   CDS Bit 0 (Local/Remote)         0  NO        1  YES
```

r0968	**Status word 1**			Min: -	Level
		Datatype: U16	Unit: -	Def: -	3
	P-Group: COMM			Max: -	

Displays active status word of inverter (in binary) and can be used to diagnose which commands are active.

Bitfields:

Bit00	Drive ready	0 NO	1 YES
Bit01	Drive ready to run	0 NO	1 YES
Bit02	Drive running	0 NO	1 YES
Bit03	Drive fault active	0 NO	1 YES
Bit04	OFF2 active	0 YES	1 NO
Bit05	OFF3 active	0 YES	1 NO
Bit06	ON inhibit active	0 NO	1 YES
Bit07	Drive warning active	0 NO	1 YES
Bit08	Deviation setpoint / act. value	0 YES	1 NO
Bit09	PZD control	0 NO	1 YES
Bit10	Maximum frequency reached	0 NO	1 YES
Bit11	Warning: Motor current limit	0 YES	1 NO
Bit12	Motor holding brake active	0 NO	1 YES
Bit13	Motor overload	0 YES	1 NO
Bit14	Motor runs right	0 NO	1 YES
Bit15	Inverter overload	0 YES	1 NO

P0970	**Factory reset**			Min: 0	Level
	CStat: C	Datatype: U16	Unit: -	Def: 0	1
	P-Group: PAR_RESET	Active: first confirm	QuickComm.: No	Max: 1	

P0970 = 1 resets all parameters to their default values.

Possible Settings:

0 Disabled
1 Parameter reset

Dependency:

- First set P0010 = 30 (factory settings).
- Stop drive (i.e. disable all pulses) before you can reset parameters to default values.

Note:

The following parameters retain their values after a factory reset:

- P0014 Store mode
- r0039 CO: Energy consumption meter [kWh]
- P0100 Europe / North America
- P0918 CB address
- P2010 USS baud rate
- P2011 USS address

P0971	**Transfer data from RAM to EEPROM**			Min: 0	Level
	CStat: CUT	Datatype: U16	Unit: -	Def: 0	3
	P-Group: COMM	Active: first confirm	QuickComm.: No	Max: 1	

Transfers values from RAM to EEPROM when set to 1.

Possible Settings:

0 Disabled
1 Start transfer

Note:

All values in RAM are transferred to EEPROM.

Parameter is automatically reset to 0 (default) after successful transfer.

The storage from RAM to EEPROM is accomplished via P0971. The communications are reset, if the transfer was successful. During the reset process communications will be interrupted. This creates the following conditions:

- PLC (e.g. SIMATIC S7) enters Stop mode
- Starter automatically recovers communications once they are re-established.
- Drivemonitor is displayed "NC" (not connected) in the status line or "drive busy".
- BOP displays "busy"

After completion of the transfer process, the communication between the inverter and the PC-tools (e.g. Starter) or BOP is automatically re-established.

3.16 Setpoint source

P1000[3]	Selection of frequency setpoint			Min: 0	Level 1
	CStat: CT	Datatype: U16	Unit: -	Def: 2	
	P-Group: SETPOINT	Active: first confirm	QuickComm.: Yes	Max: 77	

Selects frequency setpoint source. In the table of possible settings below, the main setpoint is selected from the least significant digit (i.e., 0 to 7) and any additional setpoint from the most significant digit (i.e., x0 through to x7).

Possible Settings:

0	No main setpoint		
1	MOP setpoint		
2	Analog setpoint		
3	Fixed frequency		
4	USS on BOP link		
5	USS on COM link		
6	CB on COM link		
7	Analog setpoint 2		
10	No main setpoint	+	MOP setpoint
11	MOP setpoint	+	MOP setpoint
12	Analog setpoint	+	MOP setpoint
13	Fixed frequency	+	MOP setpoint
14	USS on BOP link	+	MOP setpoint
15	USS on COM link	+	MOP setpoint
16	CB on COM link	+	MOP setpoint
17	Analog setpoint 2	+	MOP setpoint
20	No main setpoint	+	Analog setpoint
21	MOP setpoint	+	Analog setpoint
22	Analog setpoint	+	Analog setpoint
23	Fixed frequency	+	Analog setpoint
24	USS on BOP link	+	Analog setpoint
25	USS on COM link	+	Analog setpoint
26	CB on COM link	+	Analog setpoint
27	Analog setpoint 2	+	Analog setpoint
30	No main setpoint	+	Fixed frequency
31	MOP setpoint	+	Fixed frequency
32	Analog setpoint	+	Fixed frequency
33	Fixed frequency	+	Fixed frequency
34	USS on BOP link	+	Fixed frequency
35	USS on COM link	+	Fixed frequency
36	CB on COM link	+	Fixed frequency
37	Analog setpoint 2	+	Fixed frequency
40	No main setpoint	+	USS on BOP link
41	MOP setpoint	+	USS on BOP link
42	Analog setpoint	+	USS on BOP link
43	Fixed frequency	+	USS on BOP link
44	USS on BOP link	+	USS on BOP link
45	USS on COM link	+	USS on BOP link
46	CB on COM link	+	USS on BOP link
47	Analog setpoint 2	+	USS on BOP link
50	No main setpoint	+	USS on COM link
51	MOP setpoint	+	USS on COM link
52	Analog setpoint	+	USS on COM link
53	Fixed frequency	+	USS on COM link
54	USS on BOP link	+	USS on COM link
55	USS on COM link	+	USS on COM link
57	Analog setpoint 2	+	USS on COM link
60	No main setpoint	+	CB on COM link
61	MOP setpoint	+	CB on COM link
62	Analog setpoint	+	CB on COM link
63	Fixed frequency	+	CB on COM link
64	USS on BOP link	+	CB on COM link
66	CB on COM link	+	CB on COM link
67	Analog setpoint 2	+	CB on COM link
70	No main setpoint	+	Analog setpoint 2
71	MOP setpoint	+	Analog setpoint 2
72	Analog setpoint	+	Analog setpoint 2
73	Fixed frequency	+	Analog setpoint 2
74	USS on BOP link	+	Analog setpoint 2
75	USS on COM link	+	Analog setpoint 2
76	CB on COM link	+	Analog setpoint 2
77	Analog setpoint 2	+	Analog setpoint 2

Index:

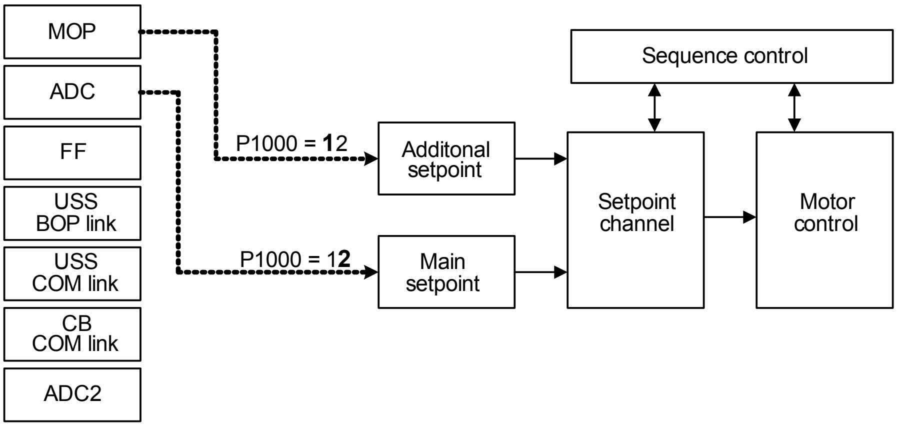
P1000[0] : 1st. Command data set (CDS)
P1000[1] : 2nd. Command data set (CDS)
P1000[2] : 3rd. Command data set (CDS)

Example:

Setting 12 selects main setpoint (2) derived from analog input with additional setpoint (1) taken from the motor potentiometer.

Example P1000 = 12 :

P1000 = **1**2 ⇒ P1070 = 755	P1070	CI: Main setpoint
	r0755	CO: Act. ADC after scal. [4000h]
P1000 = 1**2** ⇒ P1075 = 1050	P1075	CI: Additional setpoint
	r1050	CO: Act. Output freq. of the MOP



Caution:

Be aware, by changing of parameter P1000 all BICO parameters (see table below) are modified.

Note:

Single digits denote main setpoints that have no additional setpoint.

Changing this parameter sets (to default) all settings on item selected (see table).

		P1000 = xy								
		y = 0	**y = 1**	**y = 2**	**y = 3**	**y = 4**	**y = 5**	**y = 6**	**y = 7**	
P1000 = xy	**x = 0**	0.0	1050.0	755.0	1024.0	2015.1	2018.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076
	x = 1	0.0	1050.0	755.0	1024.0	2015.1	2018.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076
	x = 2	0.0	1050.0	755.0	1024.0	2015.1	2018.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		755.0	755.0	755.0	755.0	755.0	755.0	755.0	755.0	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076
	x = 3	0.0	1050.0	755.01	1024.0	2015.1	2018.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		1024.0	1024.0	1024.0	1024.0	1024.0	1024.0	1024.0	1024.0	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076
	x = 4	0.0	1050.0	755.0	1024.0	2015.1	2018.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		2015.1	2015.1	2015.1	2015.1	2015.1	2015.1	2015.1	2015.1	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076
	x = 5	0.0	1050.0	755.0	1024.0	2015.1	2018.1		755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0		1.0	P1071
		2018.1	2018.1	2018.1	2018.1	2018.1	2018.1		2018.1	P1075
		1.0	1.0	1.0	1.0	1.0	1.0		1.0	P1076
	x = 6	0.0	1050.0	755.0	1024.0	2015.1		2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0		1.0	1.0	P1071
		2050.1	2050.1	2050.1	2050.1	2050.1		2050.1	2050.1	P1075
		1.0	1.0	1.0	1.0	1.0		1.0	1.0	P1076
	x = 7	0.0	1050.0	755.0	1024.0	2015.1	2018.1	2050.1	755.1	P1070
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1071
		755.1	755.1	755.1	755.1	755.1	755.1	755.1	755.1	P1075
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	P1076

Example:

P1000 = 21 → P1070 = 1050.0
P1071 = 1.0
P1075 = 755.0
P1076 = 1.0

3.17 Fixed frequencies

P1001[3]	**Fixed frequency 1**			**Min:**	-650.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	0.00	**2**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

Defines fixed frequency setpoint 1.

There are three options available for selection of the fixed frequencies:
1. Direct selection
2. Direct selection + ON command
3. Binary coded selection + ON command

1. Direct selection (P0701 - P0706 = 15):
   - In this mode of operation 1 digital input selects 1 fixed frequency.
   - If several inputs are active together, the selected frequencies are summed.
   - E.g.: FF1 + FF2 + FF3 + FF4 + FF5 + FF6.

2. Direct selection + ON command (P0701 - P0706 = 16):
   - The fixed frequency selection combines the fixed frequencies with an ON command.
   - In this mode of operation 1 digital input selects 1 fixed frequency.
   - If several inputs are active together, the selected frequencies are summed.
   - E.g.: FF1 + FF2 + FF3 + FF4 + FF5 + FF6.

3. Binary coded selection + ON command (P0701 - P0706 = 17):
   - Up to 16 fixed frequencies can be selected using this method.
   - The fixed frequencies are selected according to the following table:

Index:

P1001[0] : 1st. Drive data set (DDS)
P1001[1] : 2nd. Drive data set (DDS)
P1001[2] : 3rd. Drive data set (DDS)

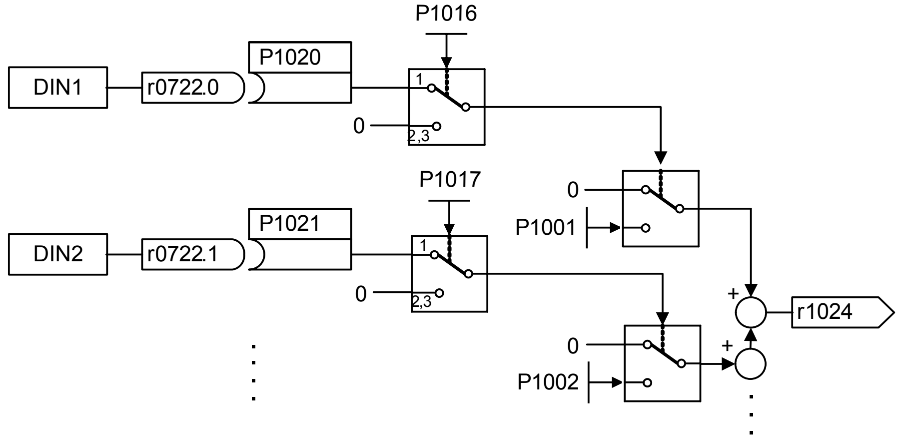
Example:

Binary coded selection :

		DIN4	**DIN3**	**DIN2**	**DIN1**
0 Hz	FF0	0	0	0	0
P1001	FF1	0	0	0	**1**
P1002	FF2	0	0	**1**	0
P1003	FF3	0	0	**1**	**1**
P1004	FF4	0	**1**	0	0
P1005	FF5	0	**1**	0	**1**
P1006	FF6	0	**1**	**1**	0
P1007	FF7	0	**1**	**1**	**1**
P1008	FF8	**1**	0	0	0
P1009	FF9	**1**	0	0	**1**
P1010	FF10	**1**	0	**1**	0
P1011	FF11	**1**	0	**1**	**1**
P1012	FF12	**1**	**1**	0	0
P1013	FF13	**1**	**1**	0	**1**
P1014	FF14	**1**	**1**	**1**	0
P1015	FF15	**1**	**1**	**1**	**1**

Direct selection of FF P1001 via DIN 1:

P0701 = 15 or P0701 = 99, P1020 = 722.0, P1016 = 1
P0702 = 15 or P0702 = 99, P1021 = 722.1, P1017 = 1



Dependency:

Select fixed frequency operation (using P1000).

Inverter requires ON command to start in the case of direct selection (P0701 - P0706 = 15).

Note:

Fixed frequencies can be selected using the digital inputs, and can also be combined with an ON command.

P1002[3]	**Fixed frequency 2**			**Min:** -650.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 5.00	**2**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

Defines fixed frequency setpoint 2.

Index:

P1002[0] : 1st. Drive data set (DDS)
P1002[1] : 2nd. Drive data set (DDS)
P1002[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1003[3]	**Fixed frequency 3**			**Min:** -650.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 10.00	**2**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

Defines fixed frequency setpoint 3.

Index:

P1003[0] : 1st. Drive data set (DDS)
P1003[1] : 2nd. Drive data set (DDS)
P1003[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1004[3]	**Fixed frequency 4**			**Min:** -650.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 15.00	**2**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

Defines fixed frequency setpoint 4.

Index:

P1004[0] : 1st. Drive data set (DDS)
P1004[1] : 2nd. Drive data set (DDS)
P1004[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1005[3]	**Fixed frequency 5**			**Min:** -650.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 20.00	**2**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

Defines fixed frequency setpoint 5.

Index:

P1005[0] : 1st. Drive data set (DDS)
P1005[1] : 2nd. Drive data set (DDS)
P1005[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1006[3]	**Fixed frequency 6**				**Min:**	-650.00	Level
	CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	25.00	**2**
	P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

Defines fixed frequency setpoint 6.

Index:

P1006[0] : 1st. Drive data set (DDS)
P1006[1] : 2nd. Drive data set (DDS)
P1006[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1007[3]	**Fixed frequency 7**				**Min:**	-650.00	Level
	CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	30.00	**2**
	P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

Defines fixed frequency setpoint 7.

Index:

P1007[0] : 1st. Drive data set (DDS)
P1007[1] : 2nd. Drive data set (DDS)
P1007[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1008[3]	**Fixed frequency 8**				**Min:**	-650.00	Level
	CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	35.00	**2**
	P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

Defines fixed frequency setpoint 8.

Index:

P1008[0] : 1st. Drive data set (DDS)
P1008[1] : 2nd. Drive data set (DDS)
P1008[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1009[3]	**Fixed frequency 9**				**Min:**	-650.00	Level
	CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	40.00	**2**
	P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

Defines fixed frequency setpoint 9.

Index:

P1009[0] : 1st. Drive data set (DDS)
P1009[1] : 2nd. Drive data set (DDS)
P1009[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1010[3]	**Fixed frequency 10**				**Min:**	-650.00	Level
	CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	45.00	**2**
	P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

Defines fixed frequency setpoint 10.

Index:

P1010[0] : 1st. Drive data set (DDS)
P1010[1] : 2nd. Drive data set (DDS)
P1010[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1011[3]	**Fixed frequency 11**				**Min:**	-650.00	Level
	CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	50.00	**2**
	P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

Defines fixed frequency setpoint 11.

Index:

P1011[0] : 1st. Drive data set (DDS)
P1011[1] : 2nd. Drive data set (DDS)
P1011[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1012[3]	Fixed frequency 12				Min:	-650.00	Level
	CStat:	CUT	Datatype: Float	Unit: Hz	Def:	55.00	2
	P-Group:	SETPOINT	Active: Immediately	QuickComm.: No	Max:	650.00	

Defines fixed frequency setpoint 12.

Index:

P1012[0] : 1st. Drive data set (DDS)
P1012[1] : 2nd. Drive data set (DDS)
P1012[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1013[3]	Fixed frequency 13				Min:	-650.00	Level
	CStat:	CUT	Datatype: Float	Unit: Hz	Def:	60.00	2
	P-Group:	SETPOINT	Active: Immediately	QuickComm.: No	Max:	650.00	

Defines fixed frequency setpoint 13.

Index:

P1013[0] : 1st. Drive data set (DDS)
P1013[1] : 2nd. Drive data set (DDS)
P1013[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1014[3]	Fixed frequency 14				Min:	-650.00	Level
	CStat:	CUT	Datatype: Float	Unit: Hz	Def:	65.00	2
	P-Group:	SETPOINT	Active: Immediately	QuickComm.: No	Max:	650.00	

Defines fixed frequency setpoint 14.

Index:

P1014[0] : 1st. Drive data set (DDS)
P1014[1] : 2nd. Drive data set (DDS)
P1014[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1015[3]	Fixed frequency 15				Min:	-650.00	Level
	CStat:	CUT	Datatype: Float	Unit: Hz	Def:	65.00	2
	P-Group:	SETPOINT	Active: Immediately	QuickComm.: No	Max:	650.00	

Defines fixed frequency setpoint 15.

Index:

P1015[0] : 1st. Drive data set (DDS)
P1015[1] : 2nd. Drive data set (DDS)
P1015[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1001 (fixed frequency 1).

P1016[3]	Fixed frequency mode - Bit 0				Min:	1	Level
	CStat:	CT	Datatype: U16	Unit: -	Def:	1	3
	P-Group:	SETPOINT	Active: first confirm	QuickComm.: No	Max:	3	

Fixed frequencies can be selected in three different modes. Parameter P1016 defines the mode of selection Bit 0.

Possible Settings:

1 Direct selection
2 Direct selection + ON command
3 Binary coded selection + ON command

Index:

P1016[0] : 1st. Command data set (CDS)
P1016[1] : 2nd. Command data set (CDS)
P1016[2] : 3rd. Command data set (CDS)

Details:

See table in P1001 (fixed frequency 1) for description of how to use fixed frequencies.

P1017[3]	**Fixed frequency mode - Bit 1**			**Min:** 1	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 1	**3**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 3	

Fixed frequencies can be selected in three different modes. Parameter P1017 defines the mode of selection Bit 1.

Possible Settings:

1 Direct selection
2 Direct selection + ON command
3 Binary coded selection + ON command

Index:

P1017[0] : 1st. Command data set (CDS)
P1017[1] : 2nd. Command data set (CDS)
P1017[2] : 3rd. Command data set (CDS)

Details:

See table in P1001 (fixed frequency 1) for description of how to use fixed frequencies.

P1018[3]	**Fixed frequency mode - Bit 2**			**Min:** 1	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 1	**3**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 3	

Fixed frequencies can be selected in three different modes. Parameter P1018 defines the mode of selection Bit 2.

Possible Settings:

1 Direct selection
2 Direct selection + ON command
3 Binary coded selection + ON command

Index:

P1018[0] : 1st. Command data set (CDS)
P1018[1] : 2nd. Command data set (CDS)
P1018[2] : 3rd. Command data set (CDS)

Details:

See table in P1001 (fixed frequency 1) for description of how to use fixed frequencies.

P1019[3]	**Fixed frequency mode - Bit 3**			**Min:** 1	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 1	**3**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 3	

Fixed frequencies can be selected in three different modes. Parameter P1019 defines the mode of selection Bit 3.

Possible Settings:

1 Direct selection
2 Direct selection + ON command
3 Binary coded selection + ON command

Index:

P1019[0] : 1st. Command data set (CDS)
P1019[1] : 2nd. Command data set (CDS)
P1019[2] : 3rd. Command data set (CDS)

Details:

See table in P1001 (fixed frequency 1) for description of how to use fixed frequencies.

P1020[3]	**BI: Fixed freq. selection Bit 0**			**Min:** 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines origin of fixed frequency selection.

Index:

P1020[0] : 1st. Command data set (CDS)
P1020[1] : 2nd. Command data set (CDS)
P1020[2] : 3rd. Command data set (CDS)

Common Settings:

P1020 = 722.0 ==> Digital input 1
P1021 = 722.1 ==> Digital input 2
P1022 = 722.2 ==> Digital input 3
P1023 = 722.3 ==> Digital input 4
P1026 = 722.4 ==> Digital input 5
P1028 = 722.5 ==> Digital input 6

Dependency:

Accessible only if P0701 - P0706 = 99 (function of digital inputs = BICO)

P1021[3]	**BI: Fixed freq. selection Bit 1**				**Min:**	0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -		**Def:**	0:0	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No		**Max:**	4000:0	

Defines origin of fixed frequency selection.

Index:

P1021[0] : 1st. Command data set (CDS)
P1021[1] : 2nd. Command data set (CDS)
P1021[2] : 3rd. Command data set (CDS)

Dependency:

Accessible only if P0701 - P0706 = 99 (function of digital inputs = BICO)

Details:

See P1020 (fixed frequency selection Bit 0) for most common settings

P1022[3]	**BI: Fixed freq. selection Bit 2**				**Min:**	0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -		**Def:**	0:0	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No		**Max:**	4000:0	

Defines origin of fixed frequency selection.

Index:

P1022[0] : 1st. Command data set (CDS)
P1022[1] : 2nd. Command data set (CDS)
P1022[2] : 3rd. Command data set (CDS)

Dependency:

Accessible only if P0701 - P0706 = 99 (function of digital inputs = BICO)

Details:

See P1020 (fixed frequency selection Bit 0) for most common settings

P1023[3]	**BI: Fixed freq. selection Bit 3**				**Min:**	0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -		**Def:**	722:3	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No		**Max:**	4000:0	

Defines origin of fixed frequency selection.

Index:

P1023[0] : 1st. Command data set (CDS)
P1023[1] : 2nd. Command data set (CDS)
P1023[2] : 3rd. Command data set (CDS)

Dependency:

Accessible only if P0701 - P0706 = 99 (function of digital inputs = BICO)

Details:

See P1020 (fixed frequency selection Bit 0) for most common settings

r1024	**CO: Act. fixed frequency**				**Min:**	-	Level
		Datatype: Float	**Unit:** Hz		**Def:**	-	**3**
	P-Group: SETPOINT				**Max:**	-	

Displays sum total of selected fixed frequencies.

P1025[3]	**Fixed frequency mode - Bit 4**				**Min:**	1	Level
	CStat: CT	**Datatype:** U16	**Unit:** -		**Def:**	1	**3**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No		**Max:**	2	

Direct selection or direct selection + ON for bit 4

Possible Settings:

1 Direct selection
2 Direct selection + ON command

Index:

P1025[0] : 1st. Command data set (CDS)
P1025[1] : 2nd. Command data set (CDS)
P1025[2] : 3rd. Command data set (CDS)

Details:

See parameter P1001 for description of how to use fixed frequencies.

P1026[3]	**BI: Fixed freq. selection Bit 4**				**Min:**	0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -		**Def:**	722:4	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No		**Max:**	4000:0	

Defines origin of fixed frequency selection.

Index:

P1026[0] : 1st. Command data set (CDS)
P1026[1] : 2nd. Command data set (CDS)
P1026[2] : 3rd. Command data set (CDS)

Dependency:

Accessible only if P0701 - P0706 = 99 (function of digital inputs = BICO).

Details:

See P1020 (fixed frequency selection Bit 0) for most common settings.

P1027[3]	Fixed frequency mode - Bit 5				Min:	1	Level
	CStat:	CT	Datatype: U16	Unit: -	Def:	1	3
	P-Group:	SETPOINT	Active: first confirm	QuickComm.: No	Max:	2	

direct selection or direct selection + ON for bit 5

Possible Settings:

1 Direct selection
2 Direct selection + ON command

Index:

P1027[0] : 1st. Command data set (CDS)
P1027[1] : 2nd. Command data set (CDS)
P1027[2] : 3rd. Command data set (CDS)

Details:

See parameter P1001 for description of how to use fixed frequencies.

P1028[3]	BI: Fixed freq. selection Bit 5				Min:	0:0	Level
	CStat:	CT	Datatype: U32	Unit: -	Def:	722:5	3
	P-Group:	COMMANDS	Active: first confirm	QuickComm.: No	Max:	4000:0	

Defines origin of fixed frequency selection.

Index:

P1028[0] : 1st. Command data set (CDS)
P1028[1] : 2nd. Command data set (CDS)
P1028[2] : 3rd. Command data set (CDS)

Dependency:

Accessible only if P0701 - P0706 = 99 (function of digital inputs = BICO).

Details:

See P1020 (fixed frequency selection Bit 0) for most common settings.

3.18 Motorized potentiometer (MOP)

P1031[3]	**Setpoint memory of the MOP**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:** 1	

Saves last motor potentiometer setpoint (MOP) that was active before OFF command or power down.

Possible Settings:

0 MOP setpoint will not be stored
1 MOP setpoint will be stored (P1040 is updated)

Index:

P1031[0] : 1st. Drive data set (DDS)
P1031[1] : 2nd. Drive data set (DDS)
P1031[2] : 3rd. Drive data set (DDS)

Note:

On next ON command, motor potentiometer setpoint will be the saved value in parameter P1040 (setpoint of the MOP).

P1032	**Inhibit negative MOP setpoints**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 1	**2**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 1	

This parameter suppresses negative setpoints of the MOP output r1050.

Possible Settings:

0 Neg. MOP setpoint is allowed
1 Neg. MOP setpoint inhibited

Note:

The reversing functions (e.g. BOP-Reverse button if P0700 = 1) are not affected by the settings of P1032. Use P1110 to fully prevent change of direction in setpoint channel.

P1035[3]	**BI: Enable MOP (UP-command)**			**Min:** 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 19:13	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines source for motor potentiometer setpoint increase frequency.

Index:

P1035[0] : 1st. Command data set (CDS)
P1035[1] : 2nd. Command data set (CDS)
P1035[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)
19.D = MOP up via BOP

P1036[3]	**BI: Enable MOP (DOWN-command)**			**Min:** 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 19:14	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines source for motor potentiometer setpoint decrease frequency.

Index:

P1036[0] : 1st. Command data set (CDS)
P1036[1] : 2nd. Command data set (CDS)
P1036[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)
19.E = MOP down via BOP

P1040[3] Setpoint of the MOP

CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Min:** -650.00	Level
P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:** 5.00	**2**
			Max: 650.00	

Determines setpoint for motor potentiometer control (P1000 = 1).

Index:

P1040[0] : 1st. Drive data set (DDS)
P1040[1] : 2nd. Drive data set (DDS)
P1040[2] : 3rd. Drive data set (DDS)

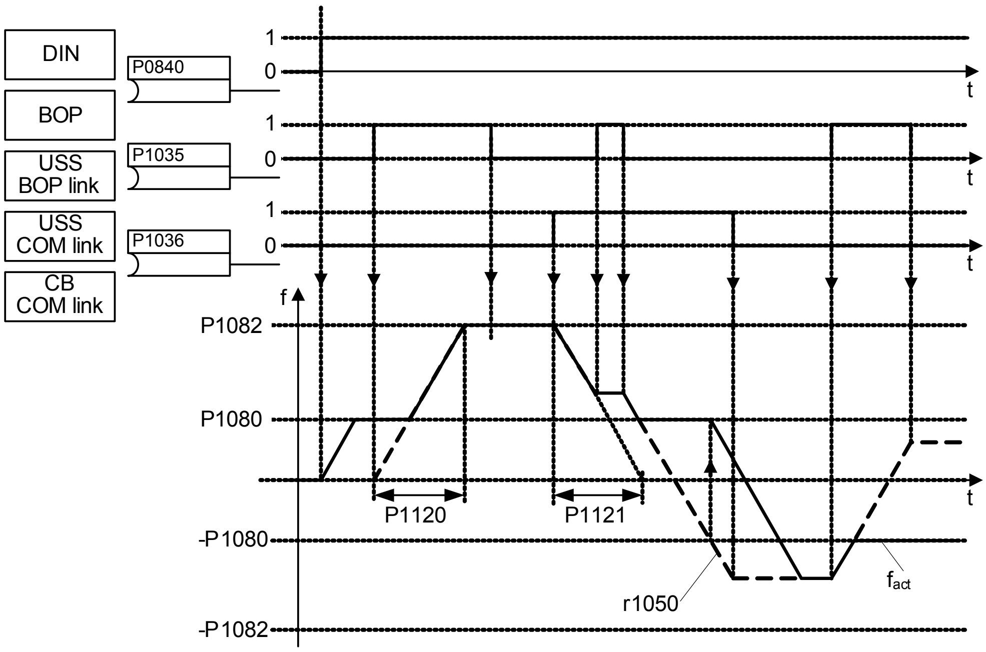
Note:

- If motor potentiometer setpoint is selected either as main setpoint or additional setpoint, the reverse direction will be inhibited by default of P1032 (inhibit reverse direction of MOP).
- To re-enable reverse direction, set P1032 = 0.

r1050 CO: Act. Output freq. of the MOP

		Min: -	Level
Datatype: Float	**Unit:** Hz	**Def:** -	**3**
P-Group: SETPOINT		**Max:** -	

Displays output frequency of motor potentiometer setpoint ([Hz]).



Possible parameter settings for the selection of MOP:

	Selection	MOP up	MOP down
DIN	P0719 = 0, P0700 = 2, P1000 = 1 or P0719 = 1, P0700 = 2	P0702 = 13 (DIN2)	P0703 = 14 (DIN3)
BOP	P0719 = 0, P0700 = 1, P1000 = 1 or P0719 = 1, P0700 = 1 or P0719 = 11	UP button	DOWN button
USS on BOP link	P0719 = 0, P0700 = 4, P1000 = 1 or P0719 = 1, P0700 = 4 or P0719 = 41	USS control word r2032 Bit13	USS control word r2032 Bit14
USS on COM link	P0719 = 0, P0700 = 5, P1000 = 1 or P0719 = 1, P0700 = 5 or P0719 = 51	USS control word r2036 Bit13	USS control word r2036 Bit14
CB	P0719 = 0, P0700 = 6, P1000 = 1 or P0719 = 1, P0700 = 6 or P0719 = 61	CB control word r2090 Bit13	CB control word r2090 Bit14

3.19 JOG

P1055[3]	**BI: Enable JOG right**			**Min:** 0:0		Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 0:0		**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0		

Defines source of JOG right.

Index:

P1055[0] : 1st. Command data set (CDS)
P1055[1] : 2nd. Command data set (CDS)
P1055[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)
19.8 = JOG right via BOP

Dependency:

Active only when P0719 < 10. See parameter P0719 (Selection of command/setpoint source).

P1056[3]	**BI: Enable JOG left**			**Min:** 0:0		Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 0:0		**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0		

Defines source of JOG left.

Index:

P1056[0] : 1st. Command data set (CDS)
P1056[1] : 2nd. Command data set (CDS)
P1056[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)
19.9 = JOG left via BOP

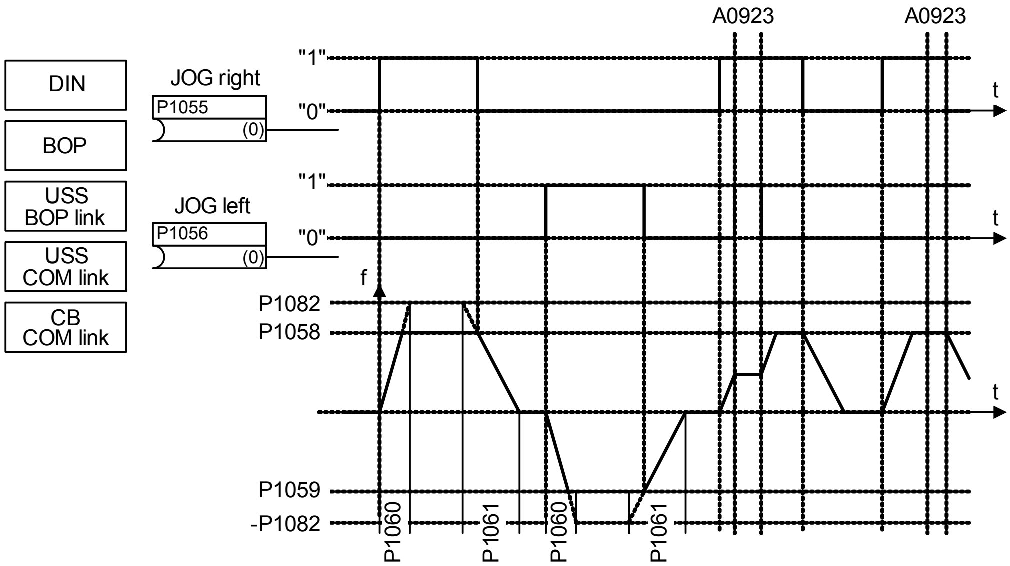
Dependency:

Active only when P0719 < 10. See parameter P0719 (Selection of command/setpoint source).

P1058[3]	**JOG frequency right**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 5.00	**2**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

Jogging increases the motor frequency by small amounts. The JOG buttons uses a non-latching switch on one of the digital inputs to control the motor frequency.

If JOG clockwise (jogging clockwise) or JOG counter-clockwise is selected, the speed is increased until the value, set in P1058 is reached.



Index:

P1058[0] : 1st. Drive data set (DDS)
P1058[1] : 2nd. Drive data set (DDS)
P1058[2] : 3rd. Drive data set (DDS)

Dependency:

P1060 and P1061 set up and down ramp times respectively for jogging.

P1059[3]	**JOG frequency left**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 5.00	**2**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

While JOG left is selected, this parameter determines the frequency at which the inverter will run.

Index:

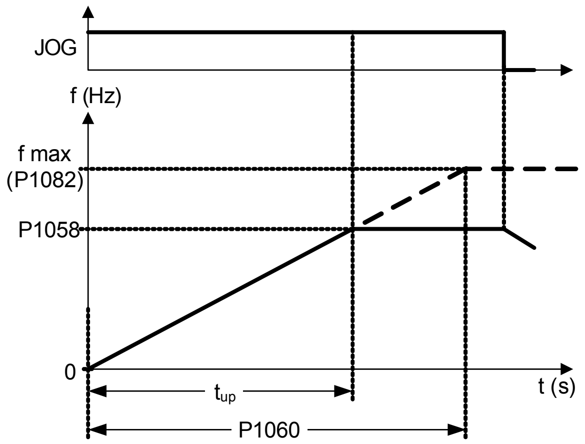
P1059[0] : 1st. Drive data set (DDS)
P1059[1] : 2nd. Drive data set (DDS)
P1059[2] : 3rd. Drive data set (DDS)

Dependency:

P1060 and P1061 set up and down ramp times respectively for jogging.

P1060[3]	**JOG ramp-up time**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 10.00	**2**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 650.00	

Sets jog ramp-up time. This is the time used while jogging is active.



$$t_{up} = \frac{P1058}{P1082} \cdot P1060$$

Index:

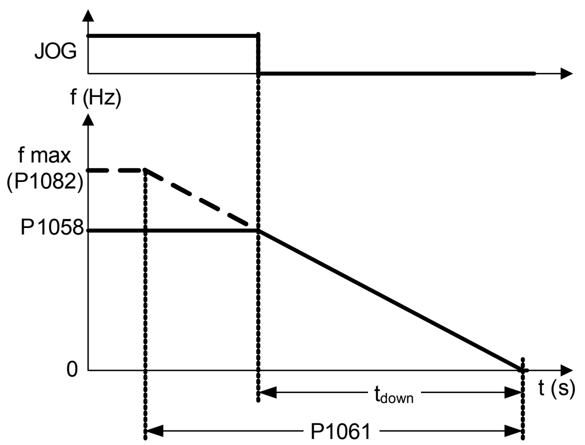
P1060[0] : 1st. Drive data set (DDS)
P1060[1] : 2nd. Drive data set (DDS)
P1060[2] : 3rd. Drive data set (DDS)

Notice:

Ramp times will be used as follows:
- P1060 / P1061 : JOG mode is active
- P1120 / P1121 : Normal mode (ON/OFF) is active
- P1060 / P1061 : Normal mode (ON/OFF) and P1124 is active

P1061[3]	**JOG ramp-down time**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 10.00	**2**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 650.00	

Sets ramp-down time. This is the time used while jogging is active.



$$t_{down} = \frac{P1058}{P1082} \cdot P1061$$

Index:

P1061[0] : 1st. Drive data set (DDS)
P1061[1] : 2nd. Drive data set (DDS)
P1061[2] : 3rd. Drive data set (DDS)

Notice:

Ramp times will be used as follows:
- P1060 / P1061 : JOG mode is active
- P1120 / P1121 : Normal mode (ON/OFF) is active
- P1060 / P1061 : Normal mode (ON/OFF) and P1124 is active

3.20 Setpoint channel

P1070[3]	**CI: Main setpoint**			**Min:** 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 755:0	**3**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines source of main setpoint.

Index:

P1070[0] : 1st. Command data set (CDS)
P1070[1] : 2nd. Command data set (CDS)
P1070[2] : 3rd. Command data set (CDS)

Common Settings:

755 = Analog input 1 setpoint
1024 = Fixed frequency setpoint
1050 = Motor potentiometer (MOP) setpoint

P1071[3]	**CI: Main setpoint scaling**			**Min:** 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 1:0	**3**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines source of the main setpoint scaling.

Index:

P1071[0] : 1st. Command data set (CDS)
P1071[1] : 2nd. Command data set (CDS)
P1071[2] : 3rd. Command data set (CDS)

Common Settings:

755 = Analog input 1 setpoint
1024 = Fixed frequency setpoint
1050 = Motor potentiometer (MOP) setpoint

P1074[3]	**BI: Disable additional setpoint**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Disables additional setpoint

Index:

P1074[0] : 1st. Command data set (CDS)
P1074[1] : 2nd. Command data set (CDS)
P1074[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99))

P1075[3]	**CI: Additional setpoint**			**Min:** 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines source of the additional setpoint (to be added to main setpoint).

Index:

P1075[0] : 1st. Command data set (CDS)
P1075[1] : 2nd. Command data set (CDS)
P1075[2] : 3rd. Command data set (CDS)

Common Settings:

755 = Analog input 1 setpoint
1024 = Fixed frequency setpoint
1050 = Motor potentiometer (MOP) setpoint

P1076[3] CI: Additional setpoint scaling

CStat: CT	**Datatype:** U32	**Unit:** -	**Min:** 0:0	**Def:** 1:0	Level **3**
P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0		

Defines source of scaling for additional setpoint (to be added to main setpoint).

Index:

P1076[0] : 1st. Command data set (CDS)
P1076[1] : 2nd. Command data set (CDS)
P1076[2] : 3rd. Command data set (CDS)

Common Settings:

1 = Scaling of 1.0 (100%)
755 = Analog input 1 Setpoint
1024 = Fixed Frequency Setpoint
1050 = MOP Setpoint

r1078 CO: Total frequency setpoint

	Datatype: Float	**Unit:** Hz	**Min:** - **Def:** -	Level **3**
P-Group: SETPOINT			**Max:** -	

Displays sum of main and additional setpoints in [Hz].

r1079 CO: Selected frequency setpoint

	Datatype: Float	**Unit:** Hz	**Min:** - **Def:** -	Level **3**
P-Group: SETPOINT			**Max:** -	

Displays selected frequency setpoint.

Following frequency setpoints are displayed:
- r1078 Total frequency setpoint
- P1058 JOG frequency right
- P1059 JOG frequency left

Dependency:

P1055 (BI: Enable JOG right) or P1056 (BI: Enable JOG left) define command source of JOG right or JOG left respectively.

Note:

P1055 = 0 and P1056 = 0 ==> Total frequency setpoint is selected.

P1080[3]	**Min. frequency**				**Min:**	0.00	Level
	CStat:	CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	0.00	**1**
	P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** Yes	**Max:**	650.00	

Sets minimum motor frequency [Hz] at which motor will run irrespective of frequency setpoint.

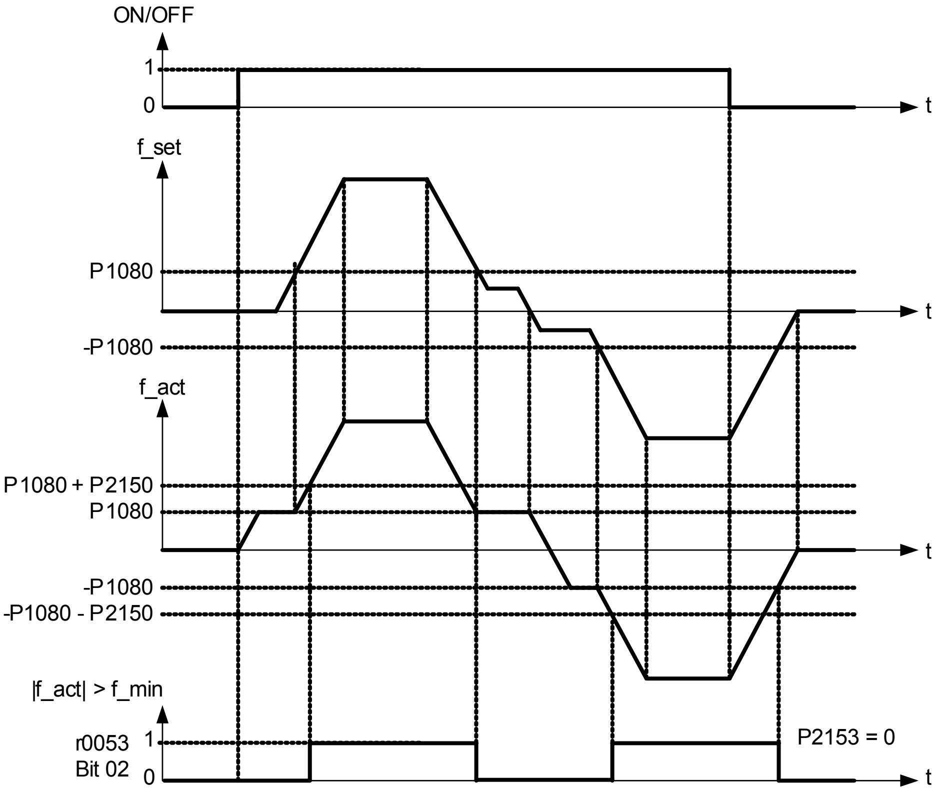
The minimum frequency P1080 represents a masking frequency of 0 Hz for all frequency target value sources (e.g. ADC, MOP, FF, USS), with the exception of the JOG target value source (analogous to P1091). Thus the frequency band +/- P1080 is run through in optimum time by means of the acceleration/deceleration ramps. Dwelling in the frequency band is not possible (see example).

Furthermore, an undershoot of the actual frequency f_act below min. frequency P1080 is output by the following signal function.

Index:

P1080[0] : 1st. Drive data set (DDS)
P1080[1] : 2nd. Drive data set (DDS)
P1080[2] : 3rd. Drive data set (DDS)

Example:



Note:

Value set here is valid both for clockwise and for anticlockwise rotation.

Under certain conditions (e.g. ramping, current limiting), motor can run below minimum frequency.

P1082[3]	**Max. frequency**			**Min:** 0.00	Level
	CStat: CT	**Datatype:** Float	**Unit:** Hz	**Def:** 50.00	**1**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 650.00	

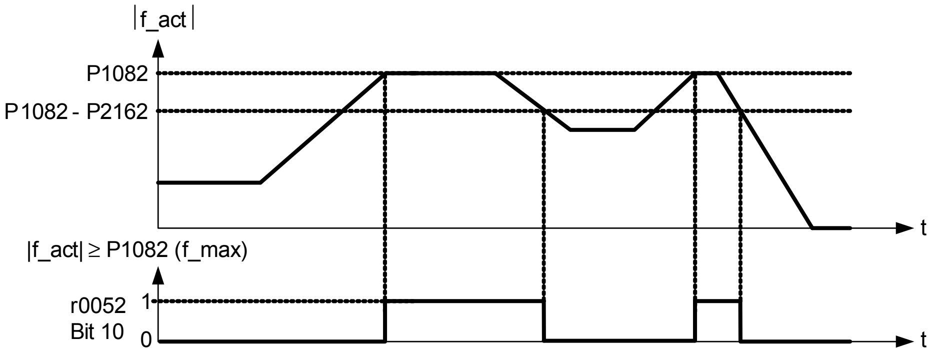
Sets maximum motor frequency [Hz] at which motor will run irrespective of the frequency setpoint. The value set here is valid for both clockwise and anticlockwise rotation.

Futhermore, the monitoring function |f_act| >= P1082 (r0052 Bit10, see example below) is affected by this parameter.

Index:

P1082[0] : 1st. Drive data set (DDS)
P1082[1] : 2nd. Drive data set (DDS)
P1082[2] : 3rd. Drive data set (DDS)

Example:



Dependency:

The maximal value of motor frequency P1082 is limited to pulse frequency P1800. P1082 is dependent on the derating characteristic as followed:

	P1800			
	2 kHz	4 kHz	6 kHz	8 - 16 kHz
f_{max} P1082	0 - 133.3 Hz	0 - 266.6 Hz	0 - 400 Hz	0 - 650 Hz

If closed-loop vector control (P1300 > 19) is selected, then the maximum frequency is internally limited by the following equation:

$$f_{max} = \min(P1082, 5 \cdot P0310, 200.00)$$

The resultant value is displayed in r1084 (resultant maximum frequency).

The maximum output frequency of inverter can be exceeded if one of the following is active:

- $p1335 \neq 0$ (Slip compensation active) :

$$f_{max}(p1335) = f_{max} + f_{slip,max} = p1082 + \frac{p1336}{100} \cdot \frac{r0330}{100} \cdot p0310$$

- $p1200 \neq 0$ (Flying restart active) :

$$f_{max}(p1200) = f_{max} + 2 \cdot f_{slip,nom} = p1082 + 2 \cdot \frac{r0330}{100} \cdot p0310$$

Note:

When using the setpoint source

- Analog Input
- USS
- CB (e.g. PROFIBUS)

The setpoint frequency (in Hz) is cyclically calculated using a percentage value (e.g. for the analog input r0754) or a hexadecimal value (e.g. for the USS r2018[1]) and the reference frequency P2000.

If for example P1082 = 80 Hz, P2000 = 50 Hz and the analog input is parameterised with P0757 = 0 V, P0758 = 0 %, P0759 = 10 V, P0760 = 100 %, a setpoint frequency of 50 Hz will be applied at 10 V of the analog input.

r1084	**Resultant max. frequency**		**Min:** -	Level
		Datatype: Float **Unit:** Hz	**Def:** -	**3**
	P-Group: CONTROL		**Max:** -	

Displays resultant maximum frequency.

P1300 < 20

$$P1800 \le 6\ \text{kHz} \rightarrow r1084 = \min(P1082, \frac{P1800}{15}, 650.00)$$

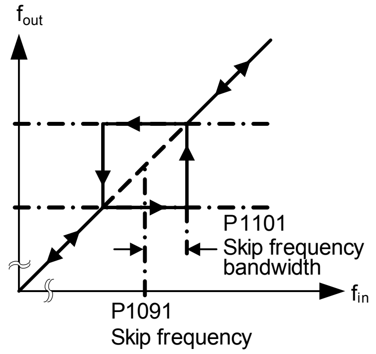
$$P1800 \ge 8\ \text{kHz} \rightarrow r1084 = \min(P1082, 650.00)$$

P1300 ≥ 20

$$r1084 = \min(P1082, 5 \cdot P0310, 200.00)$$

P1091[3]	**Skip frequency 1**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 0.00	**3**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

Defines skip frequency 1 which avoids effects of mechanical resonance and suppresses frequencies within +/- P1101 (skip frequency bandwidth).



Index:

P1091[0] : 1st. Drive data set (DDS)
P1091[1] : 2nd. Drive data set (DDS)
P1091[2] : 3rd. Drive data set (DDS)

Notice:

- Stationary operation is not possible within the suppressed frequency range; the range is merely passed through (on the ramp).
- For example, if P1091 = 10 Hz and P1101 = 2 Hz, it is not possible to operate continuously between 10 Hz +/- 2 Hz (i.e. between 8 and 12 Hz).

P1092[3]	**Skip frequency 2**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 0.00	**3**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

Defines skip frequency 2 which avoids effects of mechanical resonance and suppresses frequencies within +/- P1101 (skip frequency bandwidth).

Index:

P1092[0] : 1st. Drive data set (DDS)
P1092[1] : 2nd. Drive data set (DDS)
P1092[2] : 3rd. Drive data set (DDS)

Details:

See P1091 (skip frequency 1).

P1093[3]	**Skip frequency 3**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 0.00	**3**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

Defines skip frequency 3 which avoids effects of mechanical resonance and suppresses frequencies within +/- P1101 (skip frequency bandwidth).

Index:

P1093[0] : 1st. Drive data set (DDS)
P1093[1] : 2nd. Drive data set (DDS)
P1093[2] : 3rd. Drive data set (DDS)

Details:

See P1091 (skip frequency 1).

P1094[3]	**Skip frequency 4**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 0.00	**3**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

Defines skip frequency 4 which avoids effects of mechanical resonance and suppresses frequencies within +/- P1101 (skip frequency bandwidth).

Index:

P1094[0] : 1st. Drive data set (DDS)
P1094[1] : 2nd. Drive data set (DDS)
P1094[2] : 3rd. Drive data set (DDS)

Details:

See P1091 (skip frequency 1).

P1101[3]	**Skip frequency bandwidth**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 2.00	**3**
	P-Group: SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Max:** 10.00	

Delivers frequency bandwidth to be applied to skip frequencies (in [Hz]).

Index:

P1101[0] : 1st. Drive data set (DDS)
P1101[1] : 2nd. Drive data set (DDS)
P1101[2] : 3rd. Drive data set (DDS)

Details:

See P1091 (skip frequency 1).

P1110[3]	**BI: Inhibit neg. freq. setpoint**			**Min:** 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

This parameter suppresses negative setpoints. Therefore, modification of the motor direction is inhibited to the setpoint channel.

Index:

P1110[0] : 1st. Command data set (CDS)
P1110[1] : 2nd. Command data set (CDS)
P1110[2] : 3rd. Command data set (CDS)

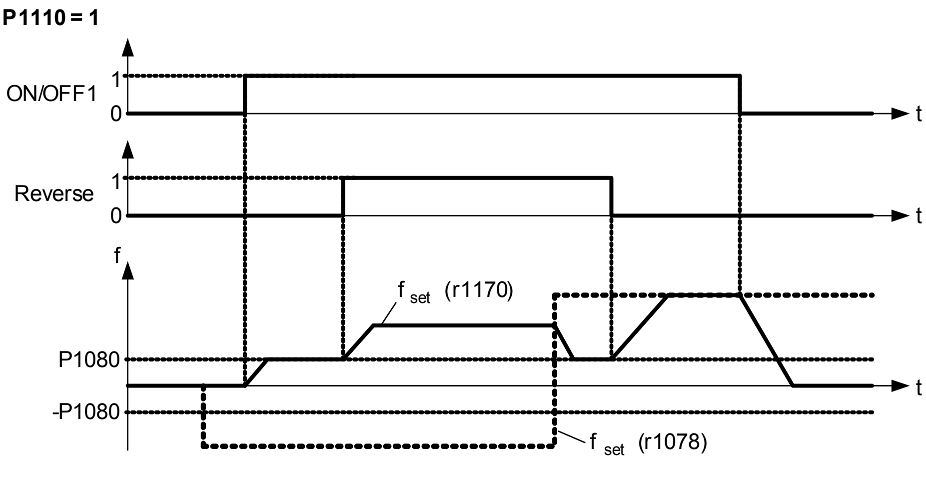
Common Settings:

0 = Disabled
1 = Enabled

Notice:

Where

- If a min. frequency (P1080) and a negative setpoint are given, the motor is accelerated by a positive value in relationship to the min. frequency.
- This function does not disable the "reverse command functions" (e.g. Reverse, ON left); rather, a reverse command causes motor to run in the positive direction only, as described above.



P1113[3]	**BI: Reverse**				**Min:** 0:0	Level
	CStat:	CT	**Datatype:** U32	**Unit:** -	**Def:** 722:1	**3**
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines source of reverse command.

Index:

P1113[0] : 1st. Command data set (CDS)
P1113[1] : 2nd. Command data set (CDS)
P1113[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
19.B = Reverse via BOP

Dependency:

Active only when P0719 < 10. See parameter P0719 (Selection of command/setpoint source).

r1114	**CO: Freq. setp. after dir. ctrl.**				**Min:** -	Level
			Datatype: Float	**Unit:** Hz	**Def:** -	**3**
	P-Group:	SETPOINT			**Max:** -	

Displays setpoint frequency after change of direction.

r1119	**CO: Freq. setpoint before RFG**				**Min:** -	Level
			Datatype: Float	**Unit:** Hz	**Def:** -	**3**
	P-Group:	SETPOINT			**Max:** -	

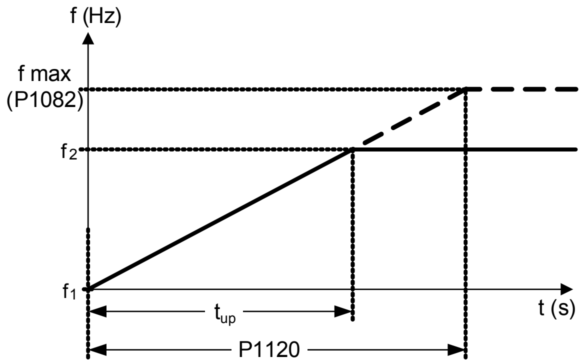
Displays output frequency after modification by other functions, e.g.:

- P1110 BI: Inhibit neg. freq. setpoint,
- P1091 - P1094 skip frequencies,
- P1080 Min. frequency,
- P1082 Max. frequency,
- limitations,
- etc.

3.21 Ramp-function generator

P1120[3]	**Ramp-up time**				**Min:** 0.00	Level
	CStat:	CUT	**Datatype:** Float	**Unit:** s	**Def:** 10.00	**1**
	P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 650.00	

Time taken for motor to accelerate from standstill up to maximum motor frequency (P1082) when no rounding is used.



$$t_{up} = \frac{|f_2 - f_1|}{P1082} \cdot P1120$$

Setting the ramp-up time too short can cause the inverter to trip (overcurrent).

Index:

P1120[0] : 1st. Drive data set (DDS)
P1120[1] : 2nd. Drive data set (DDS)
P1120[2] : 3rd. Drive data set (DDS)

Note:

If an external frequency setpoint with set ramp rates is used (e.g. from a PLC). The best way to achieve optimum drive performance is to set ramp times in P1120 and P1121 slightly shorter than those of the PLC.

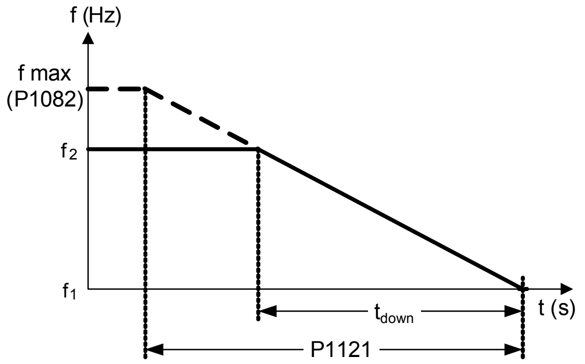
Notice:

Ramp times will be used as follows:

- P1060 / P1061 : JOG mode is active
- P1120 / P1121 : Normal mode (ON/OFF) is active
- P1060 / P1061 : Normal mode (ON/OFF) and P1124 is active

P1121[3]	**Ramp-down time**			**Min:** 0.00	Level **1**
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 10.00	
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 650.00	

Time taken for motor to decelerate from maximum motor frequency (P1082) down to standstill when no rounding is used.



$$t_{down} = \frac{|f_2 - f_1|}{P1082} \cdot P1121$$

Index:

P1121[0] : 1st. Drive data set (DDS)
P1121[1] : 2nd. Drive data set (DDS)
P1121[2] : 3rd. Drive data set (DDS)

Notice:

Setting the ramp-down time too short can cause the inverter to trip (overcurrent (F0001) / overvoltage (F0002)).

Ramp times will be used as follows:
- P1060 / P1061 : JOG mode is active
- P1120 / P1121 : Normal mode (ON/OFF) is active
- P1060 / P1061 : Normal mode (ON/OFF) and P1124 is active

P1124[3]	**BI: Enable JOG ramp times**			**Min:** 0:0	Level **3**
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines source for switching between jog ramp times (P1060, P1061) and normal ramp times (P1120, P1121) as applied to the RFG. This parameter is valid for normal mode (ON/OFF) only.

Index:

P1124[0] : 1st. Command data set (CDS)
P1124[1] : 2nd. Command data set (CDS)
P1124[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)

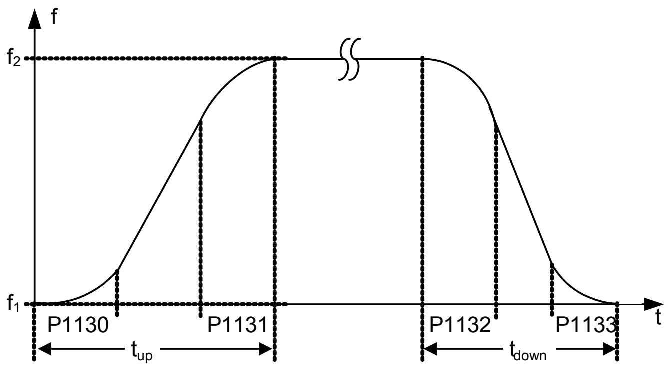
Notice:

P1124 does not have any impact when JOG mode is selected. In this case, jog ramp times (P1060, P1061) will be used all the time.

Ramp times will be used as follows:
- P1060 / P1061 : JOG mode is active
- P1120 / P1121 : Normal mode (ON/OFF) is active
- P1060 / P1061 : Normal mode (ON/OFF) and P1124 is active

P1130[3]	**Ramp-up initial rounding time**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 0.00	**2**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 40.00	

Defines initial rounding time in seconds as shown on the diagram below.



where:

for $\frac{f_2 - f_1}{P1082} \cdot P1120 \geq \frac{1}{2}(P1130 + P1131)$

$$t_{up} = \frac{1}{2}(P1130 + P1131) + \frac{f_2 - f_1}{P1082} \cdot P1120$$

for $\frac{f_2 - f_1}{P1082} \cdot P1121 \geq \frac{1}{2}(P1132 + P1133)$

$$t_{down} = \frac{1}{2}(P1132 + P1133) + \frac{f_2 - f_1}{P1082} \cdot P1121$$

Index:

P1130[0] : 1st. Drive data set (DDS)
P1130[1] : 2nd. Drive data set (DDS)
P1130[2] : 3rd. Drive data set (DDS)

Note:

- If short or zero ramp times (P1120, P1121 < P1130, P1131, P1132, P1133) are set, the total ramp up time (t_up) or ramp down time (t_down) will not depend on P1130.
- See equations above for valid conditions to calculate t_up and t_down.
- Rounding times are recommended, since they prevent an abrupt response, thus avoiding detrimental effects on the mechanics.
- Rounding times are not recommended when analog inputs are used, since they would result in overshoot/undershoot in the inverter response.

P1131[3]	**Ramp-up final rounding time**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 0.00	**2**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 40.00	

Defines rounding time at end of ramp-up as shown in P1130 (ramp-up initial rounding time).

Index:

P1131[0] : 1st. Drive data set (DDS)
P1131[1] : 2nd. Drive data set (DDS)
P1131[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1130.

P1132[3]	**Ramp-down initial rounding time**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 0.00	**2**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 40.00	

Defines rounding time at start of ramp-down as shown in P1130 (ramp-up initial rounding time).

Index:

P1132[0] : 1st. Drive data set (DDS)
P1132[1] : 2nd. Drive data set (DDS)
P1132[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1130.

P1133[3] Ramp-down final rounding time

CStat:	CUT	**Datatype:** Float	**Unit:** s	**Min:**	0.00	Level
P-Group:	SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Def:**	0.00	**2**
				Max:	40.00	

Defines rounding time at end of ramp-down as shown in P1130 (ramp-up initial rounding time).

Index:

P1133[0] : 1st. Drive data set (DDS)
P1133[1] : 2nd. Drive data set (DDS)
P1133[2] : 3rd. Drive data set (DDS)

Details:

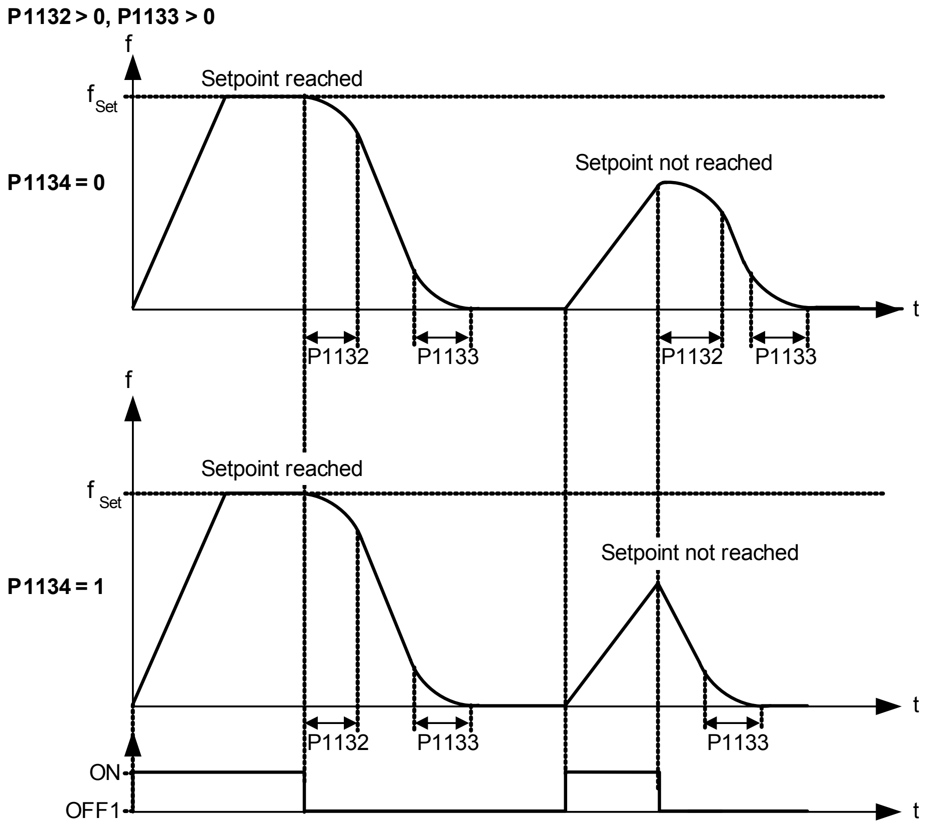
See parameter P1130.

P1134[3] Rounding type

CStat:	CUT	**Datatype:** U16	**Unit:** -	**Min:**	0	Level
P-Group:	SETPOINT	**Active:** Immediately	**QuickComm.:** No	**Def:**	0	**2**
				Max:	1	

Defines the smoothing which is active by setpoint modifications during acceleration or deceleration (e.g. new setpoint, OFF1, OFF3, REV).

This smoothing is applied, if the motor is ramped-up or ramped-down and
- P1134 = 0,
- P1132 > 0, P1133 > 0 and
- the setpoint is not yet reached.



Possible Settings:

0 Continuous smoothing
1 Discontinuous smoothing

Index:

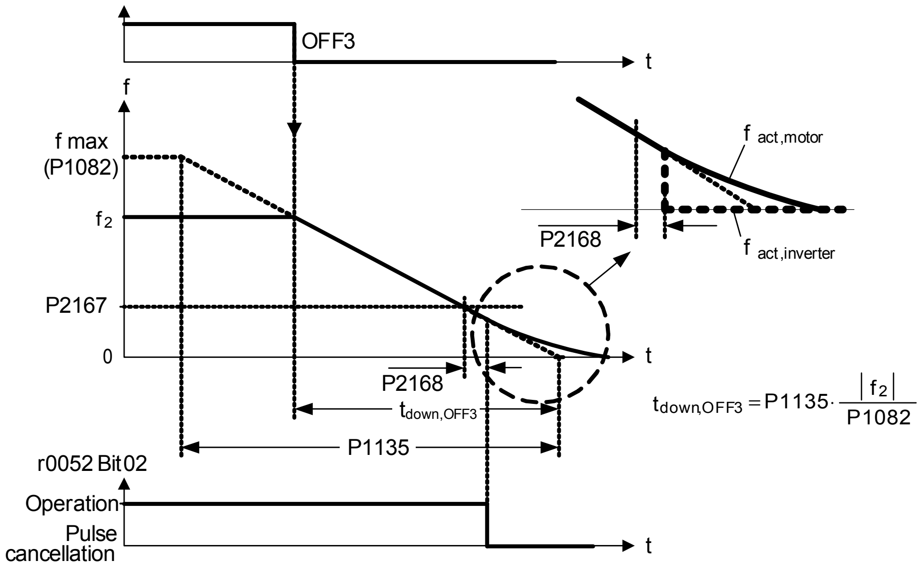
P1134[0] : 1st. Drive data set (DDS)
P1134[1] : 2nd. Drive data set (DDS)
P1134[2] : 3rd. Drive data set (DDS)

Dependency:

No effect until P1132 (Ramp-down initial rounding time) or P1133 (Ramp-down final rounding time) > 0 s.

P1135[3]	**OFF3 ramp-down time**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 5.00	**2**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 650.00	

Defines ramp-down time from maximum frequency to standstill for OFF3 command.



Index:

P1135[0] : 1st. Drive data set (DDS)
P1135[1] : 2nd. Drive data set (DDS)
P1135[2] : 3rd. Drive data set (DDS)

Note:

This time may be exceeded if the VDC_max. level is reached.

P1140[3]	**BI: RFG enable**			**Min:** 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 1:0	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines command source of RFG enable command (RFG: ramp function generator). If binary input is equal to zero then the RFG output will be set immediately to 0.

Index:

P1140[0] : 1st. Command data set (CDS)
P1140[1] : 2nd. Command data set (CDS)
P1140[2] : 3rd. Command data set (CDS)

P1141[3]	**BI: RFG start**			**Min:** 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 1:0	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines command source of RFG start command (RFG: ramp function generator). If binary input is equal to zero then the RFG output is held at it present value.

Index:

P1141[0] : 1st. Command data set (CDS)
P1141[1] : 2nd. Command data set (CDS)
P1141[2] : 3rd. Command data set (CDS)

P1142[3]	**BI: RFG enable setpoint**			**Min:** 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 1:0	**3**
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines command source of RFG enable setpoint command (RFG: ramp function generator). If binary input is equal to zero then the RFG input will be set to zero and the RFG output will be ramp-down to zero.

Index:

P1142[0] : 1st. Command data set (CDS)
P1142[1] : 2nd. Command data set (CDS)
P1142[2] : 3rd. Command data set (CDS)

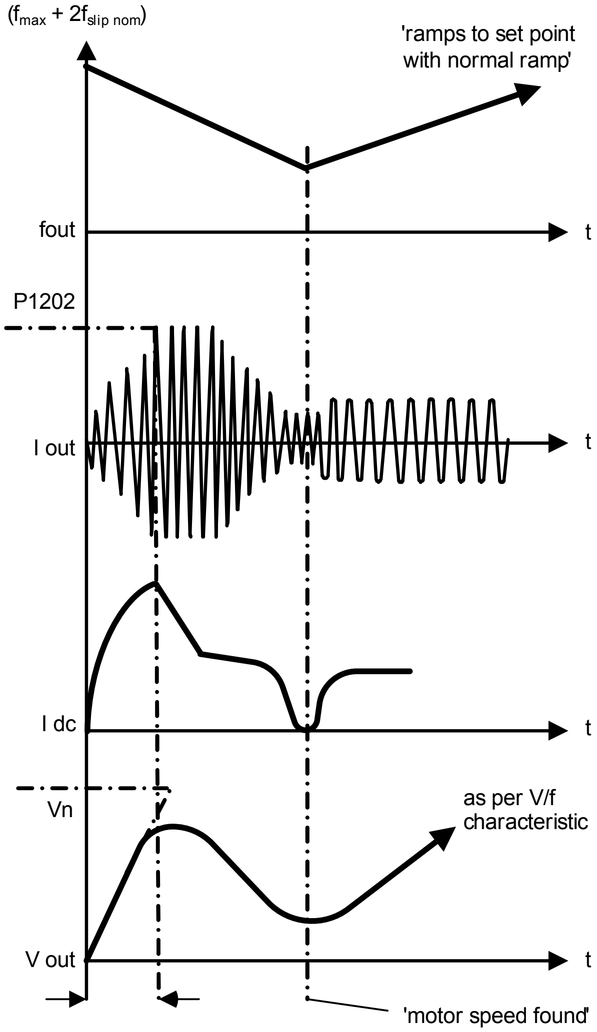
r1170	**CO: Frequency setpoint after RFG**			**Min:** -	Level
		Datatype: Float	**Unit:** Hz	**Def:** -	**3**
	P-Group: SETPOINT			**Max:** -	

Displays overall frequency setpoint after ramp generator.

3.22 Flying restart

P1200	**Flying start**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: FUNC	**Active:** first confirm	**QuickComm.:** No	**Max:** 6	

Starts inverter onto a spinning motor by rapidly changing the output frequency of the inverter until the actual motor speed has been found. Then, the motor runs up to setpoint using the normal ramp time.



Possible Settings:

0 Flying start disabled
1 Flying start is always active, start in direction of setpoint
2 Flying start is active if power on, fault, OFF2, start in direction of setpoint
3 Flying start is active if fault, OFF2, start in direction of setpoint
4 Flying start is always active, only in direction of setpoint
5 Flying start is active if power on, fault, OFF2, only in direction of setpoint
6 Flying start is active if fault, OFF2, only in direction of setpoint

Note:

- Useful for motors with high inertia loads.
- Settings 1 to 3 search in both directions.
- Settings 4 to 6 search only in direction of setpoint.
- Flying start must be used in cases where the motor may still be turning (e.g. after a short mains break) or can be driven by the load. Otherwise, overcurrent trips will occur.

P1202[3]	**Motor-current: Flying start**				**Min:**	10	Level
	CStat:	CUT	**Datatype:** U16	**Unit:** %	**Def:**	100	**3**
	P-Group:	FUNC	**Active:** first confirm	**QuickComm.:** No	**Max:**	200	

Defines search current used for flying start. Value is in [%] based on rated motor current (P0305).

Index:

P1202[0] : 1st. Drive data set (DDS)
P1202[1] : 2nd. Drive data set (DDS)
P1202[2] : 3rd. Drive data set (DDS)

Note:

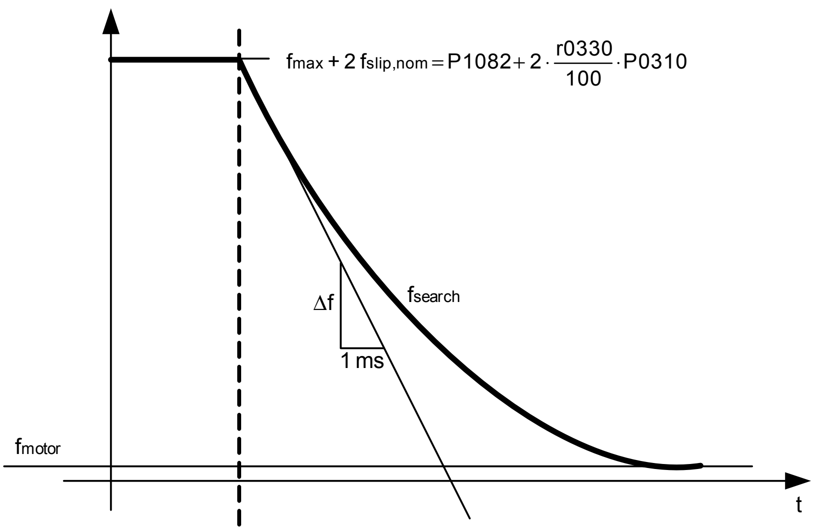
- If the search current is reduced, the flying restart behavior can be improved if the system inertia is not very high.

- The search algorithm for the flying restart is different for V/f control and closed-loop vector control.
- This is the reason that, depending on the control technique, parameter P1202 must be appropriately adapted.
- Values gained from experience indicate that good results can be achieved by
  - Increasing P1202 for V/f controls
  - Reducing P1202 for closed-loop vector controls

P1203[3]	**Search rate: Flying start**				**Min:**	10	Level
	CStat:	CUT	**Datatype:** U16	**Unit:** %	**Def:**	100	**3**
	P-Group:	FUNC	**Active:** first confirm	**QuickComm.:** No	**Max:**	200	

Sets factor by which the output frequency changes during flying start to synchronize with turning motor. This value is entered in [%] defines the reciprocal initial gradient in the search sequence (see curve below). Parameter P1203 influences the time taken to search for the motor frequency.

The search time is the time taken to search through all frequencies between max. frequency P1082 + 2 x f_slip to 0 Hz.



$$P1203[\%] = \frac{\Delta t\,[ms]}{\Delta f\,[Hz]} \cdot \frac{f_{slip,nom}\,[Hz]}{1\,[ms]} \cdot 2\,[\%] \quad \Rightarrow \quad \Delta f = \frac{2\,[\%]}{P1203[\%]} \cdot \frac{r0330}{100} \cdot P0310$$

P1203 = 100 % is defined as giving a rate of 2 % of f_slip,nom / [ms].
P1203 = 200 % would result in a rate of frequency change of 1 % of f_slip,nom / [ms].

Index:

P1203[0] : 1st. Drive data set (DDS)
P1203[1] : 2nd. Drive data set (DDS)
P1203[2] : 3rd. Drive data set (DDS)

Example:

For a motor with 50 Hz, 1350 rpm, 100 % would produce a maximum search time of 600 ms. If the motor is turning, the motor frequency is found in a shorter time.

Note:

- A higher value produces a flatter gradient and thus a longer search time.
- A lower value has the opposite effect.

- For closed-loop vector control, parameter P1203 is de-activated

r1204 Status word: Flying start V/f

P-Group: FUNC	Datatype: U16	Unit: -	Min: - / Def: - / Max: -	Level 4

Bit parameter for checking and monitoring states during search, if V/f control mode is selected (see P1300).

Bitfields:

Bit00	Current applied	0 NO	1 YES
Bit01	Current could not be applied	0 NO	1 YES
Bit02	Voltage reduced	0 NO	1 YES
Bit03	Slope-filter started	0 NO	1 YES
Bit04	Current less threshold	0 NO	1 YES
Bit05	Current-minimum	0 NO	1 YES
Bit07	Speed could not be found	0 NO	1 YES

r1205 Status word: Flying start SLVC

P-Group: FUNC	Datatype: U16	Unit: -	Min: - / Def: - / Max: -	Level 3

Bit parameter for checking status of flying start performed with n-adaption of observer. Parameter is only valid, if sensorless vector control (SLVC) is selected (see P1300).

Bitfields:

Bit00	Transformation active	0 NO	1 YES
Bit01	Initialize n-adaption	0 NO	1 YES
Bit02	Current applying	0 NO	1 YES
Bit03	N-controller closed	0 NO	1 YES
Bit04	Isd-controller open	0 NO	1 YES
Bit05	RFG hold	0 NO	1 YES
Bit06	N-adaption set to zero	0 NO	1 YES
Bit07	Reserved	0 NO	1 YES
Bit08	Reserved	0 NO	1 YES
Bit09	Reserved	0 NO	1 YES
Bit10	Direction Positive	0 NO	1 YES
Bit11	Search is started	0 NO	1 YES
Bit12	Current is applied	0 NO	1 YES
Bit13	Search is aborted	0 NO	1 YES
Bit14	Deviation is zero	0 NO	1 YES
Bit15	N-controller is active	0 NO	1 YES

3.23 Automatic restart

P1210	Automatic restart			Min: 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 1	**2**
	P-Group: FUNC	**Active:** first confirm	**QuickComm.:** No	**Max:** 6	

Configures automatic restart function

Possible Settings:

0	Disabled	
1	Trip reset after power on,	P1211 disabled
2	Restart after mains blackout,	P1211 disabled
3	Restart after mains brownout or fault,	P1211 enabled
4	Restart after mains brownout,	P1211 enabled
5	Restart after mains blackout and fault,	P1211 disabled
6	Restart after mains brown- /blackout or fault	P1211 disabled

Dependency:

Automatic restart requires constant ON command via a digital input wire link.

Caution:

P1210 > 2 can cause the motor to restart automatically without toggling the ON command !

Notice:

A "mains brownout" is where the power in interrupted and re-applied before the display on the BOP (if one is fitted to the inverter) has gone dark (a very short mains break where the DC link has not fully collapsed).

A "mains blackout" is where the display has gone dark (a long mains break where the DC link has fully collapsed) before the power is re-applied.

P1210 = 0:
Automatic restart is disabled.

P1210 = 1:
The inverter will acknowledge (reset) faults i.e. it will reset a fault when the is re-applied. This means the inverter must be fully powered down, a brownout is not sufficed. The inverter will not run until the ON command has been toggled.

P1210 = 2:
The inverter will acknowledge the fault F0003 at power on after blackout and restarts the drive. It is necessary that the ON command is wired via digital input (DIN).

P1210 = 3:
For these settings it is fundamental that the drive only restarts if it has been in a RUN state at the time of the faults (F0003, etc.). The inverter will acknowledge the fault and restarts the drive after a blackout or bronwout. It is necessary that the ON command is wired via digital input (DIN).

P1210 = 4:
For these settings it is fundamental that the drive only restarts if it has been in a RUN state at the time of the fault (F0003). The inverter will acknowledge the fault and restarts the drive after a blackout or bronwout. It is necessary that the ON command is wired via digital input (DIN).

P1210 = 5:
The inverter will acknowledge the faults F0003 etc. at power on after blackout and restarts the drive. It is necessary that the ON command is wired via digital input (DIN).

P1210 = 6:
The inverter will acknowledge the faults (F0003 etc.) at power on after blackout or brownout and restarts the drive. It is necessary that the ON command is wired via digital input (DIN). Setting 6 causes the motor to restart immediately.

Following table presents an overview of parameter P1210 and its functionality.

P1210	ON always active (permanent)				ON in no-voltage condition	
	Fault F0003 on Blackout	Fault F0003 on Brownout	All other faults on Blackout	All other faults on Brownout	All faults on Blackout	No faults on Blackout
0	–	–	–	–	–	–
1	Fault acknowl.	–	Fault acknowl.	–	Fault acknowl.	–
2	Fault acknowl. + restart	–	–	–	–	Restart
3	Fault acknowl. + restart	Fault acknowl. + restart	Fault acknowl. + restart	Fault acknowl. + restart	Fault acknowl. + restart	–
4	Fault acknowl. + restart	Fault acknowl. + restart	–	–	–	–
5	Fault acknowl. + restart	–	Fault acknowl. + restart	–	Fault acknowl. + restart	Restart
6	Fault acknowl. + restart	Fault acknowl. + restart	Fault acknowl. + restart	Fault acknowl. + restart	Fault acknowl. + restart	Restart

Flying start must be used in cases where the motor may still be turning (e.g. after a short mains break) or can be driven by the load (P1200).

P1211 Number of restart attempts

CStat: CUT	**Datatype:** U16	**Unit:** -	**Min:** 0	**Def:** 3	**Max:** 10
P-Group: FUNC	**Active:** first confirm	**QuickComm.:** No			Level **3**

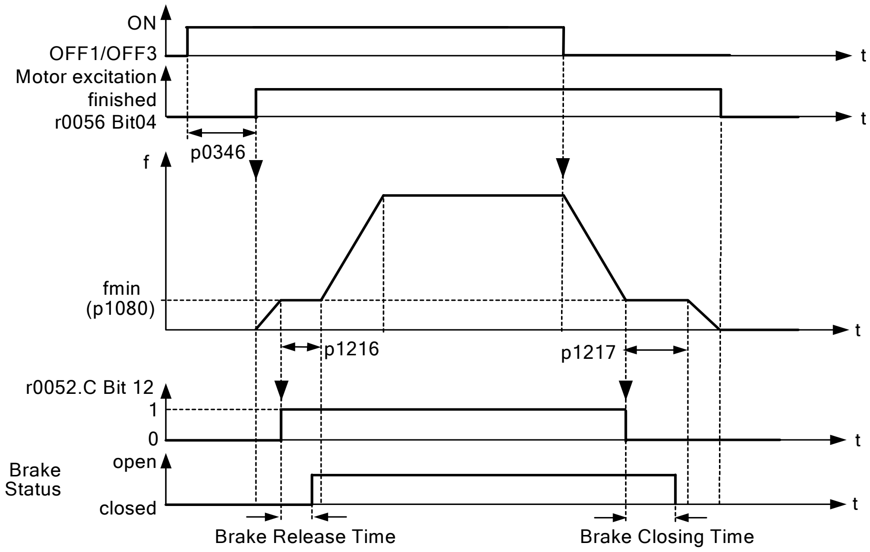
Specifies number of times inverter will attempt to restart if automatic restart P1210 is activated.

3.24 Motor holding brake

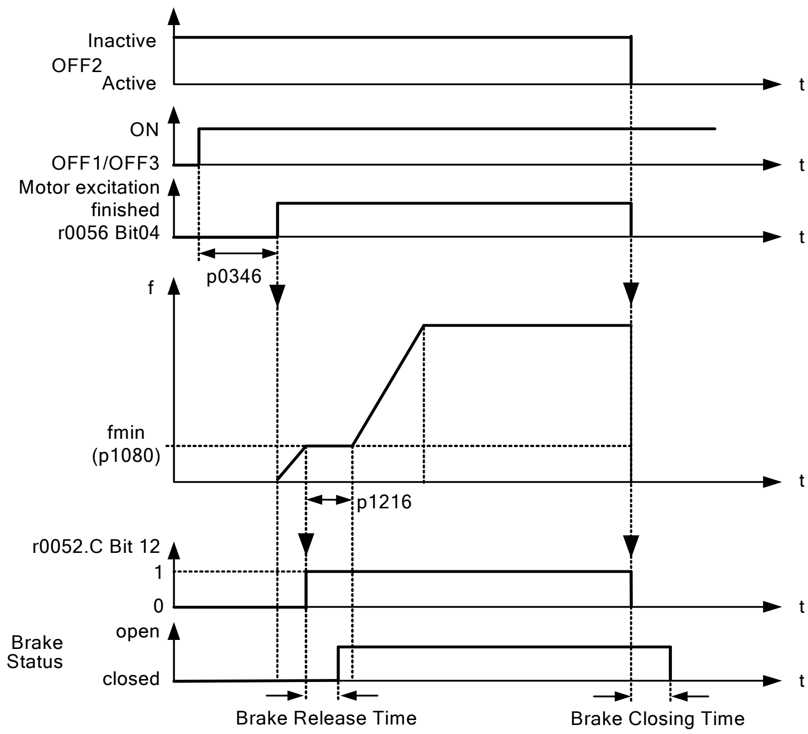
P1215	**Holding brake enable**			**Min:** 0	Level
	CStat: T	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: FUNC	**Active:** first confirm	**QuickComm.:** No	**Max:** 1	

Enables/disables holding brake function. This function applies the following profile to the inverter:

ON / OFF1/OFF3:



ON / OFF2:



Possible Settings:

0 Motor holding brake disabled
1 Motor holding brake enabled

Caution:

1. To activate the motor holding brake, in addition to parameter P1215 = 1, the status signal r0052 bit 12 "motor holding brake active" must be output via a digital output. The user must also select the signal - e.g. in parameter P0731.

2. If the motor holding brake is controlled by the drive inverter, then for potentially hazardous loads (e.g. suspended/hanging loads for crane applications) the drive inverter may not be conditioned unless the load has been secured. Before commissioning, potentially hazardous loads can be secured as follows:
   - lower the load to the floor, or
   - during commissioning or after replacing the drive inverter, prevent the drive inverter from controlling the motor holding brake. Only then should STARTER be used to carry-out a quick commissioning or a parameter download, etc. The motor holding brake terminals can then be re-used (for the motor holding brake, in this case, it is not permissible to parameterize the system so that the digital output P0748 is inverted).

3. In order to hold the motor against the mechanical brake at a certain frequency, it is important that the min. frequency P1080 approximately corresponds to the slip frequency.
   - If the value is selected to be too high, then the current drawn can be too high so that the drive inverter trips (shuts down) due to an overcurrent condition.
   - For a low value, it is possible that the torque cannot be established to hold the load.

4. It is not permissible to use the motor holding brake as operating brake as generally it is only designed and dimensioned for a limited number of emergency braking operations.

Note:

Parameter settings:
- To open/close, a digital output controls the motor holding brake at point 1/2 (refer to the diagram). In this case, as prerequisite, the motor holding brake P1215 must be activated as well as the motor holding brake selected at the digital output.
- Brake opening time P1216 greater than/equal to the time for the holding brake to open.
- Brake delay time P1217 greater than/equal to the time to close the holding brake.
- Select the minimum frequency P1080 so that it acts like weight equalization.
- A typical value of the minimum frequency P1080 for the motor holding brake is the slip frequency of the motor r0330. The rated slip frequency can be calculated using the following formula:

$$f_{Slip}[Hz] = \frac{r0330}{100} \cdot P0310 = \frac{n_{syn} - n_n}{n_{syn}} \cdot f_n$$

The following closed-loop control parameters should be observed in conjunction with the motor holding brake:
- P1310, P1311, P1333, P1335 for U/f

- P1610, P1611, P1750, P1755 for SLVC

P1216 Holding brake release delay

CStat: T	**Datatype:** Float	**Unit:** s	**Min:**	0.0	Level
P-Group: FUNC	**Active:** first confirm	**QuickComm.:** No	**Def:**	1.0	**2**
			Max:	20.0	

Defines the brake opening time of the motor holding brake (MHB).

When the motor holding brake (P1215) is activated, then the setpoint enable is delayed by the selected time. The time that it takes to open the mechanical brake is subject to certain fluctuations. This is the reason that the drive inverter applies the min. frequency P1080 to the motor during this time. This means that the brake can reliably open before the motor starts.

$$P1216 \geq \text{Release time of the brake} + \text{relay opening time(s)}$$

Details:

See parameter P1215.

P1217 Holding time after ramp down

CStat: T	**Datatype:** Float	**Unit:** s	**Min:**	0.0	Level
P-Group: FUNC	**Active:** first confirm	**QuickComm.:** No	**Def:**	1.0	**2**
			Max:	20.0	

Defines the brake delay time of the motor holding brake (MHB).

When the motor holding brake (P1215) is activated, after an off command, the pulse inhibit is delayed by this selected time. The time that it takes to open the mechanical brake is subject to certain fluctuations. This means that after braking to the min. frequency P1080, the motor is held at the minimum frequency for this time. This means that the brake can reliably close before the motor is switched into a no-current condition.

$$P1217 \geq \text{Application time of the brake} + \text{relay closing time}$$

Details:

See parameter P1215.

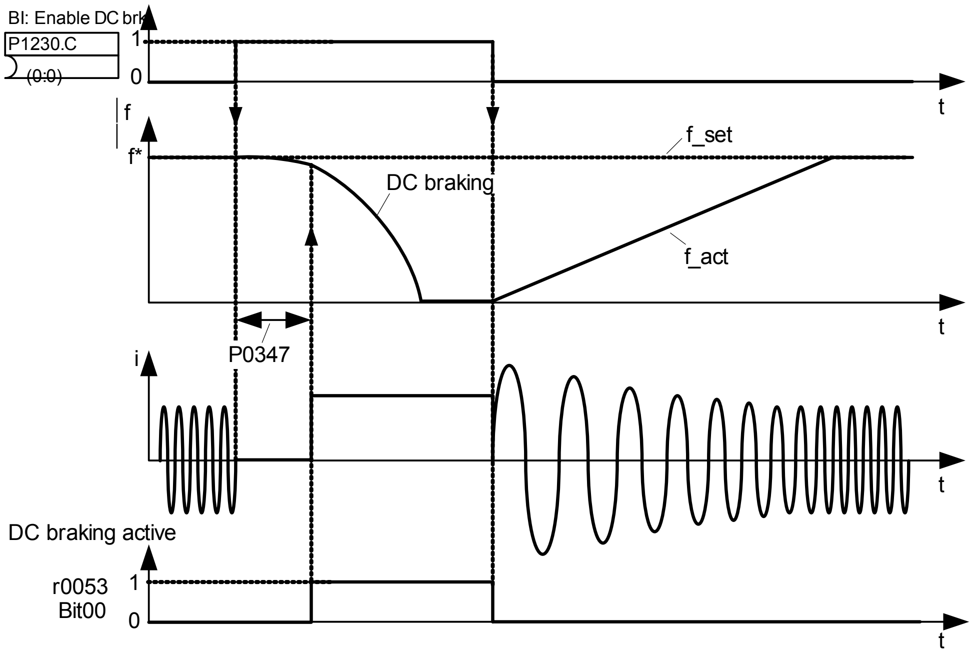
3.25 DC braking

P1230[3]	BI: Enable DC braking			Min: 0:0	Level
	CStat: CUT	Datatype: U32	Unit: -	Def: 0:0	3
	P-Group: COMMANDS	Active: first confirm	QuickComm.: No	Max: 4000:0	

Enables DC braking via a signal applied from an external source. Function remains active while external input signal is active.

DC braking causes the motor to stop rapidly by applying a DC braking current (current applied also holds shaft stationary).

When the DC braking signal is applied, the inverter output pulses are blocked and the DC current is not applied until the motor has been sufficiently demagnetized.



Note: DC brake can be applied in drive states r0002 = 1, 4, 5

The level of DC braking is set in P1232 (DC braking current - relative to the rated motor current) which is set to 100 % by default.

Index:

P1230[0] : 1st. Command data set (CDS)
P1230[1] : 2nd. Command data set (CDS)
P1230[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)

Caution:

With the DC braking, the kinetic energy of the motor is converted into heat in the motor. The drive could overheat if the remains in this status for an exessive period of time !

DC braking is not possible when using a synchronous motor (i.e. P0300 = 2).

Notice:

This delay time is set in P0347 (demagnetization time). If this delay is too short, overcurrent trips can occur.

P1232[3]	**DC braking current**			**Min:** 0		Level **2**
	CStat: CUT	**Datatype:** U16	**Unit:** %	**Def:** 100		
	P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Max:** 250		

Defines level of DC current in [%] relative to rated motor current (P0305).

$$r0027_{DC-Brake}[A] \approx \frac{1}{\sqrt{2}} \cdot P0305 \cdot \frac{P1232}{100\%}$$

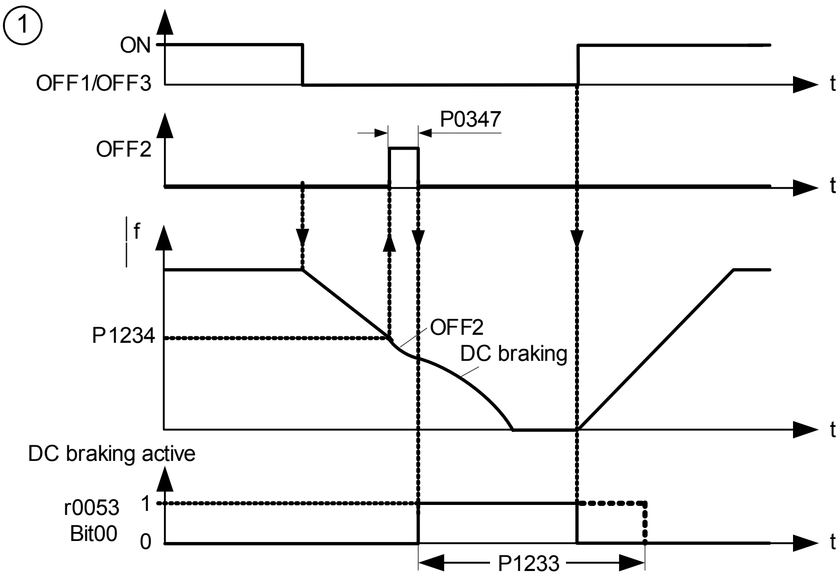
The current of the DC-braking is limited by r0067.

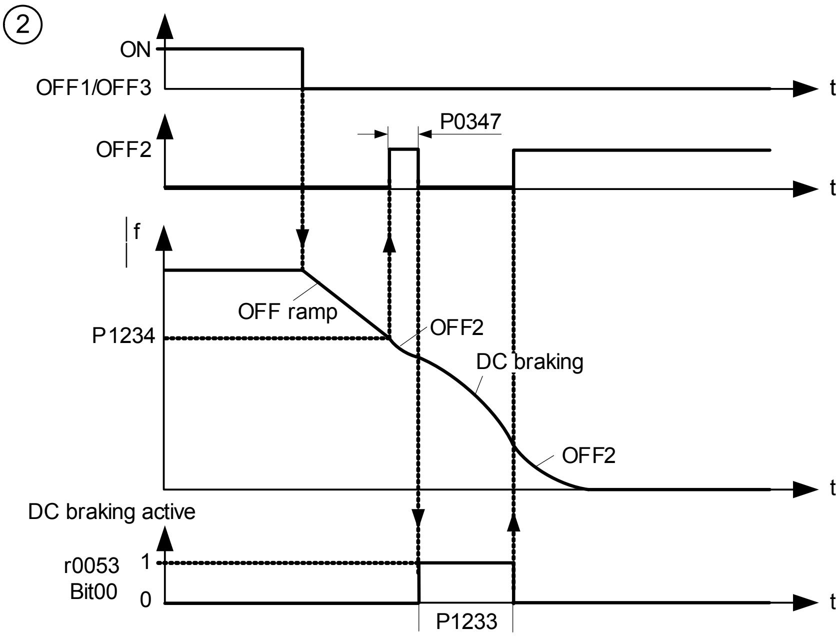
Index:

P1232[0] : 1st. Drive data set (DDS)
P1232[1] : 2nd. Drive data set (DDS)
P1232[2] : 3rd. Drive data set (DDS)

P1233[3]	**Duration of DC braking**			**Min:** 0.00		Level **2**
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 0.00		
	P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Max:** 250.00		

Defines duration for which DC injection braking is to be active following an OFF1 or OFF3 command. When an OFF1 or OFF3 command is received by the drive, the output frequency starts to ramp to 0 Hz. When the output frequency reaches the value set in P1234, the drive injects a DC braking current P1232 for the time duration set in P1233.





The DC current, that is impressed during time P1233, is specified by parameter P1232.

Index:

P1233[0] : 1st. Drive data set (DDS)
P1233[1] : 2nd. Drive data set (DDS)
P1233[2] : 3rd. Drive data set (DDS)

Value:

P1233 = 0.00 :
Not active following OFF1 / OFF3.

P1233 = 0.01 - 250.00 :
Active for the specified duration.

Caution:

With the DC braking, the kinetic energy of the motor is converted into heat in the motor. The drive could overheat if the remains in this status for an exessive period of time !

DC braking is not possible when using a synchronous motor (i.e. P0300 = 2).

Notice:

The DC braking function causes the motor to stop rapidly by applying a DC braking current (the current applied also holds the shaft stationary). When the DC braking signal is applied, the inverter output pulses are blocked and the DC current not applied until the motor has been sufficiently demagnetized. Demagnetization time is calculated automatically from motor data.

The inverter will not restart if an ON-command is given during this period.

P1234[3]	**DC braking start frequency**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 650.00	**2**
	P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

Sets start frequency for DC braking.

When an OFF1 or OFF3 command is received by the drive, the output frequency starts to ramp to 0 Hz. When the output frequency reaches the value set in start frequency of DC braking P1234, the drive injects a DC braking current P1232 for the time duration set in P1233.

Index:

P1234[0] : 1st. Drive data set (DDS)
P1234[1] : 2nd. Drive data set (DDS)
P1234[2] : 3rd. Drive data set (DDS)

Details:

See P1232 (DC braking current) and P1233 (duration of DC braking)

3.26 Compound braking

P1236[3]	**Compound braking current**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** %	**Def:** 0	**2**
	P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Max:** 250	

Defines DC level superimposed on AC waveform after exeeding DC-link voltage threshold of compound braking. The value is entered in [%] relative to rated motor current (P0305).

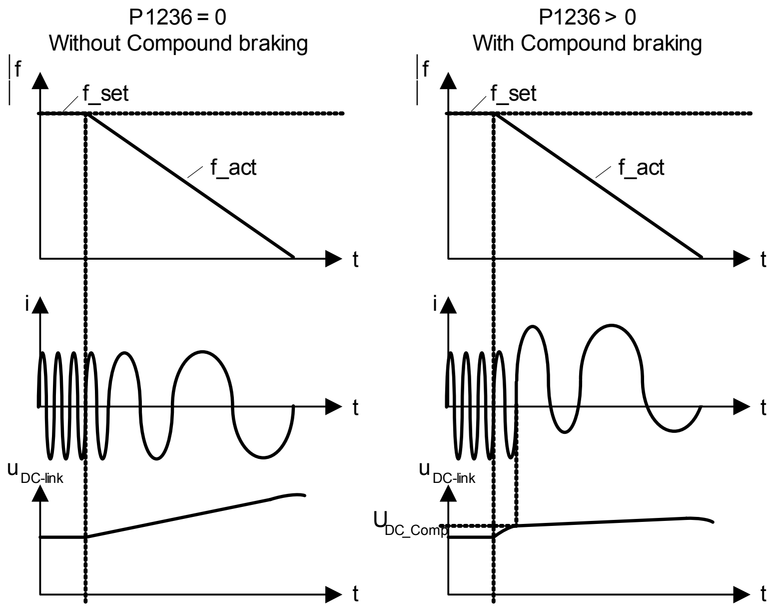
If P1254 = 0 :

Compound braking switch-on level $U_{DC_Comp} = 1.13 \cdot \sqrt{2} \cdot V_{mains} = 1.13 \cdot \sqrt{2} \cdot P0210$

otherwise :

Compound braking switch-on level $U_{DC_Comp} = 0.98 \cdot r1242$

The Compound Brake is an overlay of the DC brake function with regenerative braking (effective braking at the ramp) after OFF1 or OFF3. This enables braking with controlled motor frequency and a minimum of energy returned to the motor. Through optimization of the ramp-down time and the compound braking an efficient braking without additional HW components is possible.



Index:

P1236[0] : 1st. Drive data set (DDS)
P1236[1] : 2nd. Drive data set (DDS)
P1236[2] : 3rd. Drive data set (DDS)

Value:

P1236 = 0 :
Compound braking disabled.

P1236 = 1 - 250 :
Level of DC braking current defined as a [%] of rated motor current (P0305).

Dependency:

Compound braking depends on the DC link voltage only (see threshold above). It will be active with OFF1/OFF3 and at regenerating conditions.

It is disabled, when:
- DC braking is active
- Flying start is active
- Vector mode (SLVC, VC) is selected

Notice:

Increasing the value will generally improve braking performance; however, if you set the value too high, an overcurrent trip may result. If used with dynamic braking enabled as well compound braking will take priority. If used with the Vdc max controller enabled the drive behaviour whilst braking may be worsened paticularly with high values of compound braking.

Compound braking does not function when the drive is in vector control.

3.27 Dynamic braking

P1237	**Dynamic braking**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Max:** 5	

Dynamic braking absorbs the braking energy. This parameter activates the function "Dynamic braking" and defines the rated duty cycle of the braking resistor (chopper resistor). Dynamic braking is active when the function is enabled and DC-link voltage exeeds the dynamic braking switch-on level, see below.

If a motor is quickly ramped down by the inverter or a big load is dropped by a lifting application, the motor works in regenerating mode and saves energy back to the inverter. In this case the DC-link voltage of the inverter raises. If that voltage gets too high (overvaltage , F0002), the inverter pulses are disabled and the motor coasts to standstill. With dynamic braking the regenerative energy is fed by the chopper to the external braking resistor and converted into heat. So it is possible to brake down the drive in a controlled way.

Dynamic braking switch-on level

If P1254 = 0 :

$$V_{DC,Chopper} = 1.13 \cdot \sqrt{2} \cdot V_{mains} = 1.13 \cdot \sqrt{2} \cdot P0210$$

otherwise :

$$V_{DC,Chopper} = 0.98 \cdot r1242$$

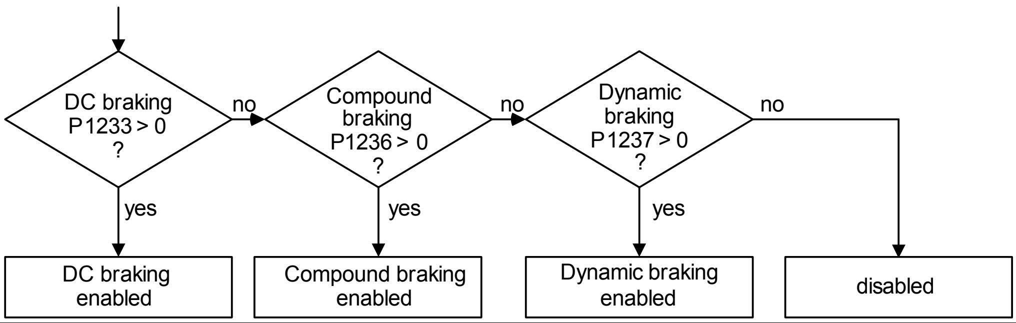
Possible Settings:

0 Disabled
1 5 % duty cycle
2 10 % duty cycle
3 20 % duty cycle
4 50 % duty cycle
5 100 % duty cycle

Dependency:

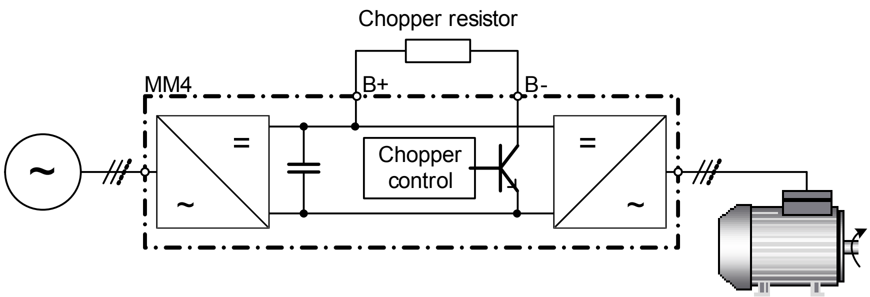
This function is not available for for MM440 PX (FSFX and FSGX).

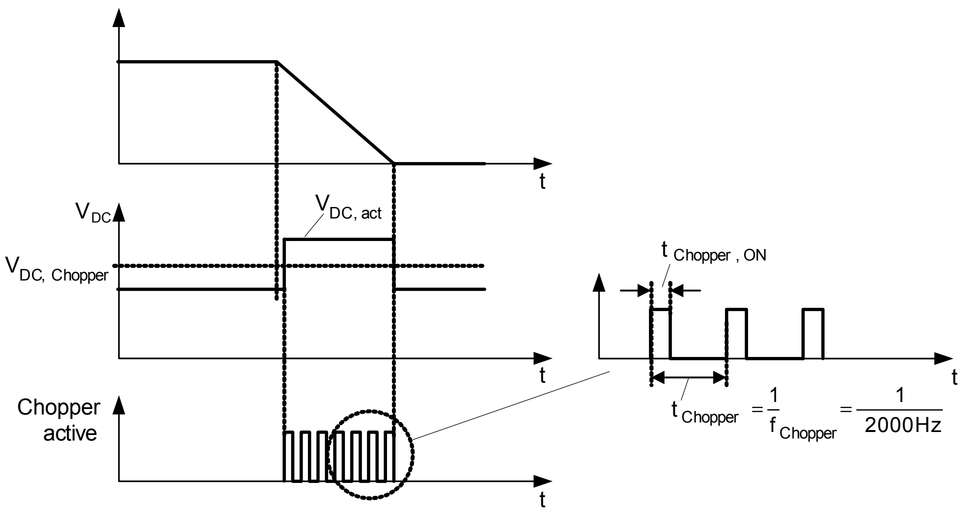
If used with DC braking enabled as well compound braking will take priority.

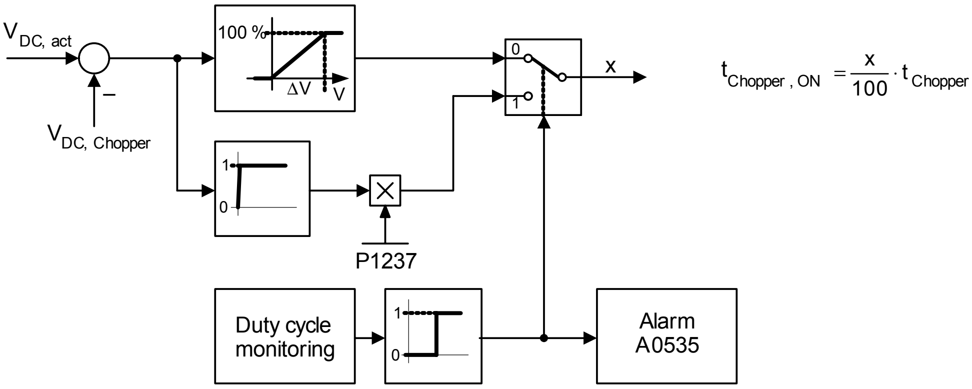


Notice:

Initially the brake will operate at a high duty cycle dependant on the DC link level until the thermal limit is approached. The duty cycle specified by this parameter will then be imposed. The resistor should be able to operate at this level indefinitely without overheating.







	Mains		
	200 - 240 V	380 - 480 V	500 - 600 V
Δ V	9.8 V	17.0 V	21.3 V

The threshold for the warning A0535 is equivalent to 10 seconds running at 95 % duty cycle. The duty cycle will be limited when it was running 12 seconds at 95 % duty cycle.

3.28 Vdc controller

P1240[3]	**Configuration of Vdc controller**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 1	**3**
	P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Max:** 3	

Enables / disables Vdc controller.

The Vdc controller dynamically controls the DC link voltage to prevent overvoltage trips on high inertia systems.

Possible Settings:

0 Vdc controller disabled
1 Vdc-max controller enabled
2 Kinetic buffering (Vdc-min controller) enabled
3 Vdc-max controller and kinetic buffering (KIB) enabled

Index:

P1240[0] : 1st. Drive data set (DDS)
P1240[1] : 2nd. Drive data set (DDS)
P1240[2] : 3rd. Drive data set (DDS)

Caution:

If P1245 increased too much, it may interfere with the drive normal operation.

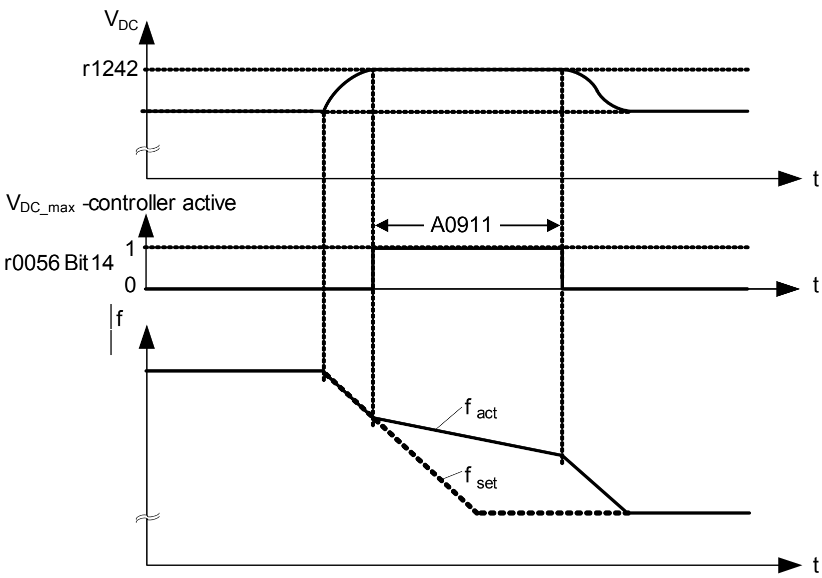
Note:

Vdc max controller automatically increases ramp-down times to keep the DC-link voltage (r0026) within limits (r1242).

Vdc min is activated if DC-link voltage falls below the switch on level,P1245. The kinetic energy of the motor is then used to buffer the DC-link voltage, thus causing deceleration of the drive. If the drive trips F0003 immediately, try increasing the dynamic factor first, P1247. If still tripping F0003 try then increasing the switch on level, P1245.

r1242	CO: Switch-on level of Vdc-max			Min: -	Level 3
		Datatype: Float	Unit: V	Def: -	
	P-Group: FUNC			Max: -	

Displays switch-on level of Vdc max controller.



Following equation is only valid , if P1254 = 0 :

$$r1242 = 1.15 \cdot \sqrt{2} \cdot V_{mains} = 1.15 \cdot \sqrt{2} \cdot P0210$$

otherwise :

r1242 is internally calculated

Note:

Parameter r1242 (switch-in threshold) is determined by each power cycle, when precharging of the DC-link is finished.

P1243[3]	Dynamic factor of Vdc-max			Min: 10	Level 3
	CStat: CUT	Datatype: U16	Unit: %	Def: 100	
	P-Group: FUNC	Active: Immediately	QuickComm.: No	Max: 200	

Defines dynamic factor for DC link controller in [%].

Index:

P1243[0] : 1st. Drive data set (DDS)
P1243[1] : 2nd. Drive data set (DDS)
P1243[2] : 3rd. Drive data set (DDS)

Dependency:

P1243 = 100 % means parameters P1250, P1251 and P1252 (gain, integration time and differential time) are used as set. Otherwise, these are multiplied by P1243 (dynamic factor of Vdc-max).

Note:

Vdc controller adjustment is calculated automatically from motor and inverter data.

P1245[3] **Switch on level kin. buffering**

CStat: CUT	**Datatype:** U16	**Unit:** %	**Min:** 65	Level
P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:** 76	**3**
			Max: 115	

Enter switch-on level for kinetic buffering (KIB) in [%] relative to supply voltage (P0210).

$$P1245[V] = \frac{P1245[\%]}{100} \cdot \sqrt{2} \cdot P0210$$

Index:

P1245[0] : 1st. Drive data set (DDS)
P1245[1] : 2nd. Drive data set (DDS)
P1245[2] : 3rd. Drive data set (DDS)

Warning:

Increasing the value too much, may interfere with the drive normal operation.

Note:

Changing P1254 does not affect the switch-on-level for KIB.

r1246[3] **CO:Switch-on level kin buffering**

	Datatype: Float	**Unit:** V	**Min:** -	Level
P-Group: FUNC			**Def:** -	**3**
			Max: -	

Displays switch-on level of kinetic buffering (KIB, Vdc min controller).

Depending on the setting selected, the frequency limit defined in P1245 is used to either hold the speed or disable pulses. If not enough regeneration is produced, drive may trip undervoltage.

P1247[3] **Dyn. factor of kinetic buffering**

CStat: CUT	**Datatype:** U16	**Unit:** %	**Min:** 10	Level
P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:** 100	**3**
			Max: 200	

Enters dynamic factor for kinetic buffering (KIB, Vdc-min controller).

P1247 = 100 %
means parameters P1250, P1251 and P1252 (gain, integration time and differential time) are used as set. Otherwise, these are multiplied by P1247 (dynamic factor of Vdc-min).

Index:

P1247[0] : 1st. Drive data set (DDS)
P1247[1] : 2nd. Drive data set (DDS)
P1247[2] : 3rd. Drive data set (DDS)

Note:

Vdc controller adjustment is calculated automatically from motor and inverter data.

P1250[3] **Gain of Vdc-controller**

CStat: CUT	**Datatype:** Float	**Unit:** -	**Min:** 0.00	Level
P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:** 1.00	**4**
			Max: 10.00	

Enters gain for Vdc controller.

Index:

P1250[0] : 1st. Drive data set (DDS)
P1250[1] : 2nd. Drive data set (DDS)
P1250[2] : 3rd. Drive data set (DDS)

P1251[3] **Integration time Vdc-controller**

CStat: CUT	**Datatype:** Float	**Unit:** ms	**Min:** 0.1	Level
P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:** 40.0	**4**
			Max: 1000.0	

Enters integral time constant for Vdc controller.

Index:

P1251[0] : 1st. Drive data set (DDS)
P1251[1] : 2nd. Drive data set (DDS)
P1251[2] : 3rd. Drive data set (DDS)

P1252[3] **Differential time Vdc-controller**

CStat: CUT	**Datatype:** Float	**Unit:** ms	**Min:** 0.0	Level
P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Def:** 1.0	**4**
			Max: 1000.0	

Enters differential time constant for Vdc controller.

Index:

P1252[0] : 1st. Drive data set (DDS)
P1252[1] : 2nd. Drive data set (DDS)
P1252[2] : 3rd. Drive data set (DDS)

P1253[3]	Vdc-controller output limitation			Min:	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	10.00	**3**
	P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Max:**	600.00	

Limits maximum effect of Vdc max controller.

Index:

P1253[0] : 1st. Drive data set (DDS)
P1253[1] : 2nd. Drive data set (DDS)
P1253[2] : 3rd. Drive data set (DDS)

P1254	Auto detect Vdc switch-on levels			Min:	0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:**	1	**3**
	P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Max:**	1	

Enables/disables auto-detection of switch-on levels for Vdc control functionalities.

Following switch-on levels are calculated

- Switch-on level chopper
- Switch-on level compound brake
- Switch-on level Vdc_max controller r1242

P1254 does not have any effect on the
- Switch-on level kin. buffering r1246

Possible Settings:

0 Disabled
1 Enabled

Note:

The switch-on thresholds are only calculated during the start-up of the inverter after connection to the mains. An online-adaption is not performed during operation. This means that modification of P1254 does not immediately take effect and variations in the mains are also not initially taken into account.

P1254 = 0 (Automatic Detection disabled):
The above thresholds are calculated via P0210, if automatic detection is disabled.

P1256[3]	Reaction of kinetic buffering			Min:	0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:**	0	**3**
	P-Group: FUNC	**Active:** Immediately	**QuickComm.:** No	**Max:**	2	

Enters reaction for kinetic buffering controller (Vdc-min controller).

Depending on the setting selected, the frequency limit defined in P1257 is used to either hold the speed or disable pulses. If not enough regeneration is produced, drive may trip undervoltage.

Possible Settings:

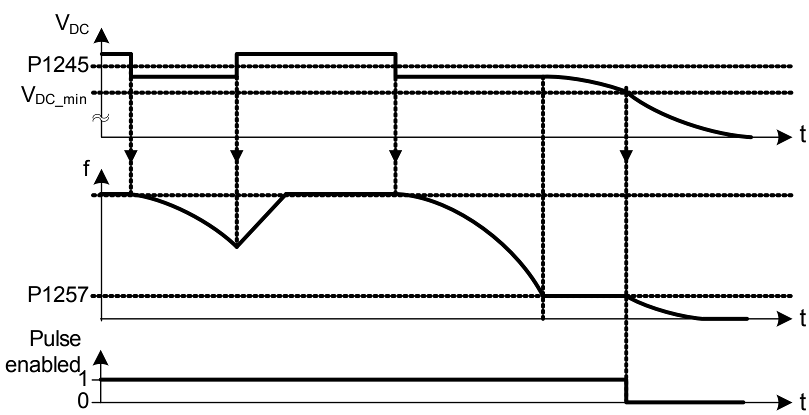
0 Maintain DC-link until trip
1 Maintain DC-link until trip / stop
2 Control stop

Index:

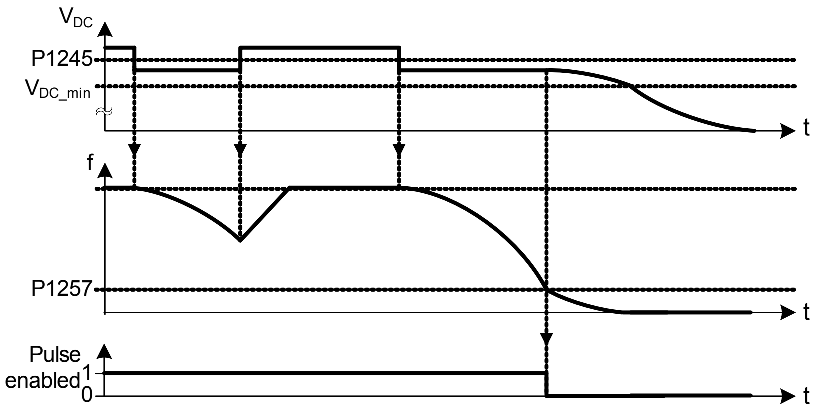
P1256[0] : 1st. Drive data set (DDS)
P1256[1] : 2nd. Drive data set (DDS)
P1256[2] : 3rd. Drive data set (DDS)

Note:

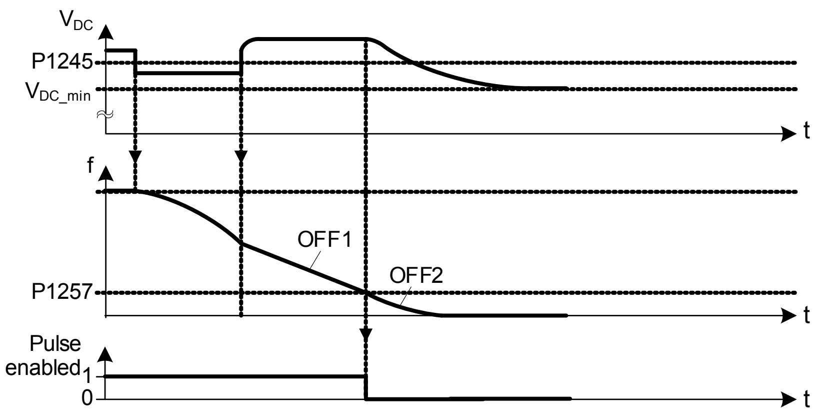
P1256 = 0:
Maintain dclink voltage until mains is returned or drive is tripped undervoltage. The frequency is kept above the frequency limit provided in P1257.



P1256 = 1:
Maintain dclink voltage until mains is returned or drive is tripped undervoltage or pulses disabled when frequency falls below the limit in P1257.



P1256 = 2:
This option ramps down the frequency to stand still even when mains return. If mains return, then an OFF1 is active until P1257 limit then pulses disabled. If mains does not return, frequency brought down under the control of vdc-min controller until P1257 limit then pulses disabled or undervoltage has occurred.



P1257[3]	Freq limit for kinetic buffering			Min: 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 2.50	**3**
	P-Group: SETPOINT	**Active:** first confirm	**QuickComm.:** No	**Max:** 600.00	

Frequency which kinetic buffering (KIB) either hold speed or disable pulses depending on P1256.

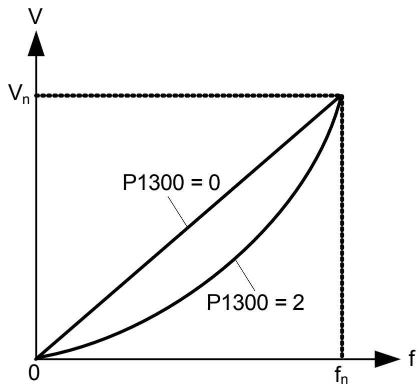
Index:

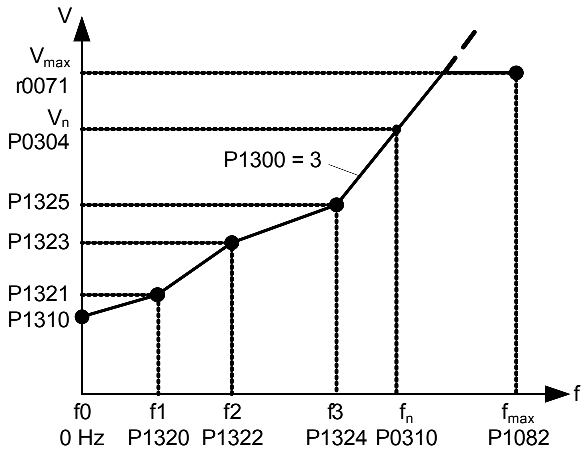
P1257[0] : 1st. Drive data set (DDS)
P1257[1] : 2nd. Drive data set (DDS)
P1257[2] : 3rd. Drive data set (DDS)

3.29 Control mode

P1300[3]	**Control mode**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 23	

Controls relationship between speed of motor and voltage supplied by inverter as illustrated in the diagram below.





Possible Settings:

0 V/f with linear characteristic
1 V/f with FCC
2 V/f with parabolic characteristic
3 V/f with programmable characteristic
4 Reserved
5 V/f for textile applications
6 V/f with FCC for textile applications
19 V/f control with independent voltage setpoint
20 Sensorless vector control
21 Vector control with sensor
22 Sensorless vector torque-control
23 Vector torque-control with sensor

Index:

P1300[0] : 1st. Drive data set (DDS)
P1300[1] : 2nd. Drive data set (DDS)
P1300[2] : 3rd. Drive data set (DDS)

Dependency:

See parameter P0205, P0500

Caution:

When commissioning Vector Control with encoder-feedback (VC), the drive should be configured for V/f mode (see P1300) first. Run the drive and compare r0061 with r0021 that should agree in
- sign and
- magnitude (with a deviation of only a few percent).

Only if both criteria are fullfilled, change P1300 and select VC (P1300 = 21 or 23).

P0400 = 1 (single channel encoder) will only allow operation in one direction. If operation in both directions is required, connect an encoder with 2 channels (A and B) and select setting 2. See the Operating Instructions of the encoder module for more information.

Note:

P1300 = 1 : V/f with FCC (flux current control)
- Maintains motor flux current for improved efficiency.
- If FCC is chosen, linear V/f is active at low frequencies.

P1300 = 2 : V/f with a quadratic characteristic
- Suitable for centrifugal fans / pumps

P1300 = 3 : V/f with a programmable characteristic
- User defined characteristic (see P1320)
- For synchronous motors (e.g. SIEMOSYN motors)

P1300 = 5,6 : V/f for textil applications
- Slip compensation disabled.
- Imax controller modifies the output voltage only.
- Imax controller does not influence the output frequency.

P1300 = 19 : V/f control with independent voltage setpoint

The following table presents an overview of control parameters (V/f) that can be modify in relationship to P1300 dependencies:

ParNo.	Parameter name	Level	V/f							SLVC		VC	
			P1300 =										
			0	1	2	3	5	6	19	20	22	21	23
P1300[3]	Control mode	2	x	x	x	x	x	x	x	x	x	x	x
P1310[3]	Continuous boost	2	x	x	x	x	x	x	x	–	–	–	–
P1311[3]	Acceleration boost	2	x	x	x	x	x	x	x	–	–	–	–
P1312[3]	Starting boost	2	x	x	x	x	x	x	x	–	–	–	–
P1316[3]	Boost end frequency	3	x	x	x	x	x	x	x	–	–	–	–
P1320[3]	Programmable V/f freq. coord. 1	3	–	–	–	x	–	–	–	–	–	–	–
P1321[3]	Programmable V/f volt. coord. 1	3	–	–	–	x	–	–	–	–	–	–	–
P1322[3]	Programmable V/f freq. coord. 2	3	–	–	–	x	–	–	–	–	–	–	–
P1323[3]	Programmable V/f volt. coord. 2	3	–	–	–	x	–	–	–	–	–	–	–
P1324[3]	Programmable V/f freq. coord. 3	3	–	–	–	x	–	–	–	–	–	–	–
P1325[3]	Programmable V/f volt. coord. 3	3	–	–	–	x	–	–	–	–	–	–	–
P1330[3]	CI: Voltage setpoint	3	–	–	–	–	–	–	x	–	–	–	–
P1333[3]	Start frequency for FCC	3	–	x	–	–	–	x	–	–	–	–	–
P1335[3]	Slip compensation	2	x	x	x	x	–	–	–	–	–	–	–
P1336[3]	CO: U/f Slip limit	2	x	x	x	x	–	–	–	–	–	–	–
P1338[3]	Resonance damping gain V/f	3	x	x	x	x	–	–	–	–	–	–	–
P1340[3]	Imax freq. controller prop. gain	3	x	x	x	x	x	x	x	–	–	–	–
P1341[3]	Imax controller integral time	3	x	x	x	x	x	x	x	–	–	–	–
P1345[3]	Imax controller prop. gain	3	x	x	x	x	x	x	x	–	–	–	–
P1346[3]	Imax voltage ctrl. integral time	3	x	x	x	x	x	x	x	–	–	–	–
P1350[3]	Voltage soft start	3	x	x	x	x	x	x	x	–	–	–	–

SLVC / VC can provide excellent performance for the following types of application:
- Applications which require high torque performance
- Applications which require fast respond to shock loading
- Applications which require torque holding while passing through 0 Hz
- Applications which require very accurate speed holding
- Applications which require motor pull out protection

SLVC/VC-Restrictions:
- SLVC / VC is dependent on the accuracy of the motor model being used and the measurements being performed by the inverter. There are therefore certain restrictions on the use of SLVC / VC:

- f_{max} = min(200 Hz, 5 • P0310) (max. frequency)
- $\frac{1}{4} \leq \frac{P0305}{r0207} \leq \frac{r0209}{r0207}$ (ratio of rated motor current to rated inverter current)
- no synchronuos motor

Recommended means of SLVC/VC-commissioning:
- For correct operation under SLVC / VC control it is imperative that the name plate data of the motor (P0304 - P0310) is correctly entered and that the motor data identification (P1910) must be carried out on a cold motor. It is also necessary to ensure that the motor ambient temperature is correctly entered in P0625 if this is significantly different from the default value of 20°C. This must be done after the quick commissioning has been completed (P3900) but before the motor data identification measurements are carried out.
- See parameter P0400 and documentation of encoder and encoder module when commissioning VC (P1300 = 21 or 23).

SLVC/VC-Optimisation:

The following parameters can be adjusted by the user to improve performance.
- P0003 = 3
- P0342: Total / motor inertia ratio

Sensorless Vector Control (SLVC):
- P1470: P gain (SLVC)
- P1472: I term (SLVC)
- P1610: Continuous torque boost (SLVC, open loop boost)
- P1611: Acceleration torque boost (SLVC, open loop boost)
- P1750: Control word of motor model
- P1755: Start-frequency motor model (SLVC)

Vector Control (VC):
- P1460: P gain
- P1462: I term

The following table presents an overview of control parameters (SLVC, VC) that can be modify in relationship to P1300 dependencies:

ParNo.	Parameter name	Level	V/f							SLVC		VC	
			P1300 =										
			0	1	2	3	5	6	19	20	22	21	23
P1400[3]	Configuration of speed control	3	–	–	–	–	–	–	–	–	–	x	–
P1442[3]	Filter time for act. speed	3	–	–	–	–	–	–	–	–	–	x	–
P1452[3]	Filter time for act.speed (SLVC)	3	–	–	–	–	–	–	–	x	–	–	–
P1460[3]	Gain speed controller	2	–	–	–	–	–	–	–	–	–	x	–
P1462[3]	Integral time speed controller	2	–	–	–	–	–	–	–	–	–	x	–
P1470[3]	Gain speed controller (SLVC)	2	–	–	–	–	–	–	–	x	–	–	–
P1472[3]	Integral time n-ctrl. (SLVC)	2	–	–	–	–	–	–	–	x	–	–	–
P1477[3]	BI: Set integrator of n-ctrl.	3	–	–	–	–	–	–	–	x	–	x	–
P1478[3]	CI: Set integrator value n-ctrl.	3	–	–	–	–	–	–	–	x	–	x	–
P1488[3]	Droop input source	3	–	–	–	–	–	–	–	x	–	x	–
P1489[3]	Droop scaling	3	–	–	–	–	–	–	–	x	–	x	–
P1492[3]	Enable droop	3	–	–	–	–	–	–	–	x	–	x	–
P1496[3]	Scaling accel. precontrol	3	–	–	–	–	–	–	–	x	–	x	–
P1499[3]	Scaling accel. torque control	3	–	–	–	–	–	–	–	–	x	–	–
P1500[3]	Selection of torque setpoint	2	–	–	–	–	–	–	–	x	x	x	x
P1501[3]	BI: Change to torque control	3	–	–	–	–	–	–	–	x	x	x	x
P1503[3]	CI: Torque setpoint	3	–	–	–	–	–	–	–	–	x	–	x
P1511[3]	CI: Additional torque setpoint	3	–	–	–	–	–	–	–	x	x	x	x
P1520[3]	CO: Upper torque limit	2	–	–	–	–	–	–	–	x	x	x	x
P1521[3]	CO: Lower torque limit	2	–	–	–	–	–	–	–	x	x	x	x
P1522[3]	CI: Upper torque limit	3	–	–	–	–	–	–	–	x	x	x	x
P1523[3]	CI: Lower torque limit	3	–	–	–	–	–	–	–	x	x	x	x
P1525[3]	Scaling lower torque limit	3	–	–	–	–	–	–	–	x	x	x	x
P1530[3]	Motoring power limitation	2	–	–	–	–	–	–	–	x	x	x	x
P1531[3]	Regenerative power limitation	2	–	–	–	–	–	–	–	x	x	x	x
P1570[3]	CO: Fixed value flux setpoint	2	–	–	–	–	–	–	–	x	x	x	x
P1574[3]	Dynamic voltage headroom	3	–	–	–	–	–	–	–	x	x	x	x
P1580[3]	Efficiency optimization	2	–	–	–	–	–	–	–	x	x	x	x
P1582[3]	Smooth time for flux setpoint	3	–	–	–	–	–	–	–	x	x	x	x
P1596[3]	Int. time field weak. controller	3	–	–	–	–	–	–	–	x	x	x	x
P1610[3]	Continuous torque boost (SLVC)	2	–	–	–	–	–	–	–	x	x	–	–
P1611[3]	Acc. torque boost (SLVC)	2	–	–	–	–	–	–	–	x	x	–	–
P1740	Gain for oscillation damping	3	–	–	–	–	–	–	–	x	x	–	–
P1750[3]	Control word of motor model	3	–	–	–	–	–	–	–	x	x	x	x
P1755[3]	Start-freq. motor model (SLVC)	3	–	–	–	–	–	–	–	x	x	–	–
P1756[3]	Hyst.-freq. motor model (SLVC)	3	–	–	–	–	–	–	–	x	x	–	–
P1758[3]	T(wait) transit to feed-fwd-mode	3	–	–	–	–	–	–	–	x	x	–	–
P1759[3]	T(wait) for n-adaption to settle	3	–	–	–	–	–	–	–	x	x	–	–
P1764[3]	Kp of n-adaption (SLVC)	3	–	–	–	–	–	–	–	x	x	–	–
P1780[3]	Control word of Rs/Rr-adaption	3	–	–	–	–	–	–	–	x	x	–	–
P0400[3]	Select encoder type	2	–	–	–	–	–	–	–	–	–	x	x
P0408[3]	Encoder pulses per revolution	2	–	–	–	–	–	–	–	–	–	x	x
P0491[3]	Reaction on speed signal loss	2	–	–	–	–	–	–	–	–	–	x	x
P0492[3]	Allowed speed difference	2	–	–	–	–	–	–	–	–	–	x	x
P0494[3]	Delay speed loss reaction	2	–	–	–	–	–	–	–	–	–	x	x

1) If the speed control (main setpoint) is selected a torque setpoint is available via the additional setpoint channel.

3.29.1 V/f control technique

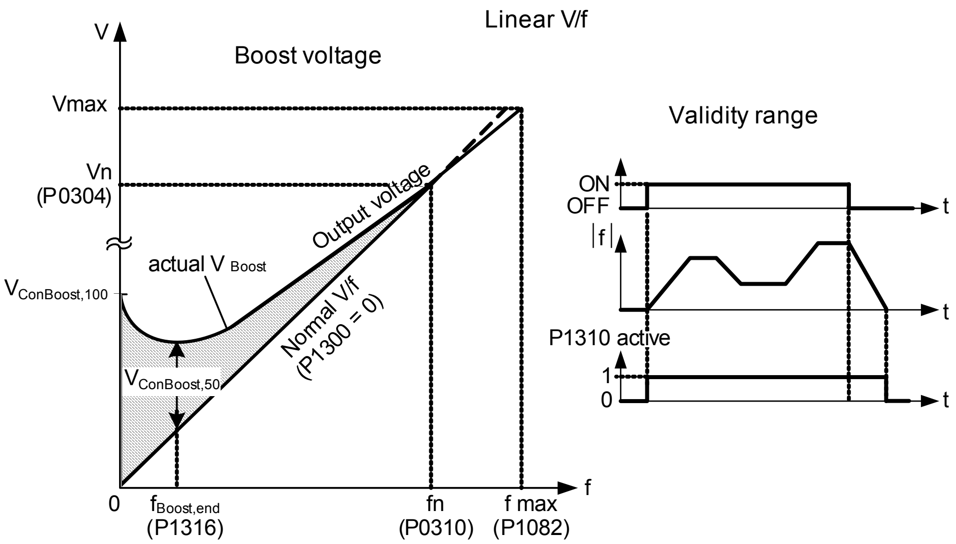
P1310[3]	**Continuous boost**				**Min:** 0.0	Level
	CStat:	CUT	**Datatype:** Float	**Unit:** %	**Def:** 50.0	**2**
	P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 250.0	

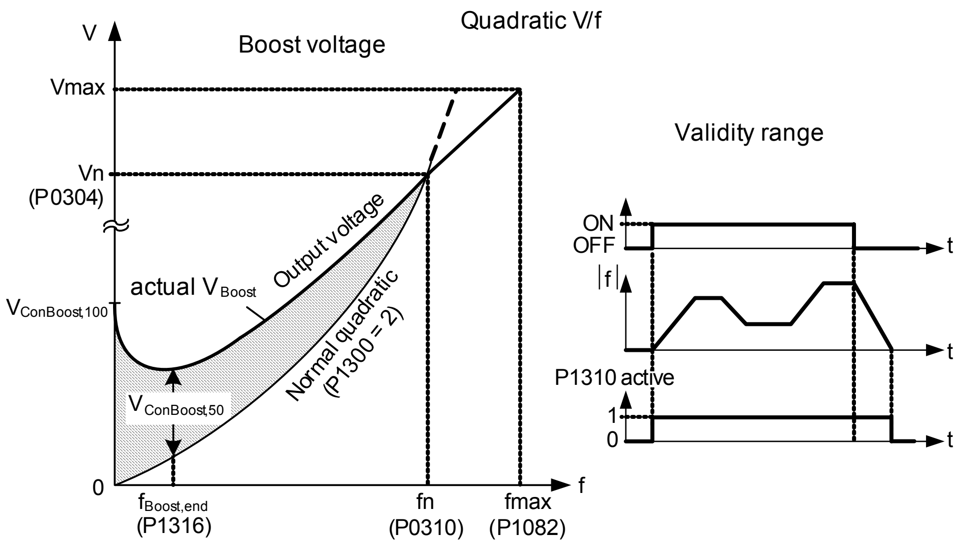
P1310 causes a voltage boost depending on the output frequency (see diagran). At low output frequencies the output voltage is low to keep the flux level constant. However, the output voltage may be too low

- for magnetisation the asynchronous motor
- to hold the load
- to overcome losses in the system.

To compensate these effects, the output voltage can be increased using parameter P1310.

Defines boost level in [%] relative to P0305 (rated motor current) applicable to both linear and quadratic V/f curves according to the diagram below:





where voltage values are given

$$V_{ConBoost,100} = P0305 \cdot P0350 \cdot \frac{P1310}{100}$$

$$V_{ConBoost,50} = \frac{V_{ConBoost,100}}{2}$$

Index:

P1310[0] : 1st. Drive data set (DDS)
P1310[1] : 2nd. Drive data set (DDS)
P1310[2] : 3rd. Drive data set (DDS)

Dependency:

Continous boost P1310 has no effect during vector operation because the inverter calculates continously the optimum operating conditions.

Note:

- Increasing the boost levels increases motor heating (especially at standstill).
- The boost values are combined when continuous boost (P1310) used in conjunction with other boost parameters (acceleration boost P1311 and starting boost P1312).
- However priorities are allocated to these parameters as follows:
  P1310 > P1311 > P1312
- The total boost is limited by following equation:

$$\sum V_{Boost} \le 3 \cdot R_s \cdot I_{Mot} = 3 \cdot P0305 \cdot P0350$$

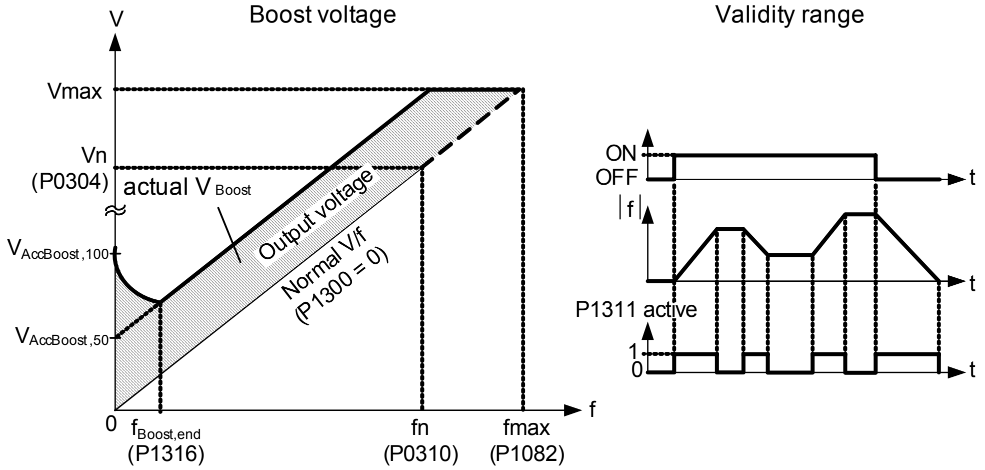
- Setting in P0640 (motor overload factor [%]) limits the boost:

$$\frac{\sum V_{Boost}}{P0305 \cdot P0350} \le \frac{P0640}{100}$$

P1311[3]	**Acceleration boost**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 0.0	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 250.0	

P1311 will only produce boost during ramping, and is therefore useful for additional torque during acceleration and deceleration. Contrary to P1312, that is only active when an ON command is given, p1311 is active after each acceleration resp. deceleration. The boost is active, if P1311 > 0 resp. if the conditiones given below are fulfilled.

Applies boost in [%] relative to P0305 (rated motor current) following a positive setpoint change and drops back out once the setpoint is reached. It is activated when the setpoint changes and deactivated when the setpoint is reached.



where voltage values are given

$$V_{AccBoost,100} = P0305 \cdot P0350 \cdot \frac{P1311}{100}$$

$$V_{AccBoost,50} = \frac{V_{AccBoost,100}}{2}$$

Index:

P1311[0] : 1st. Drive data set (DDS)
P1311[1] : 2nd. Drive data set (DDS)
P1311[2] : 3rd. Drive data set (DDS)

Dependency:

Acceleration boost P1311 has no effect during vector operation.

Note:

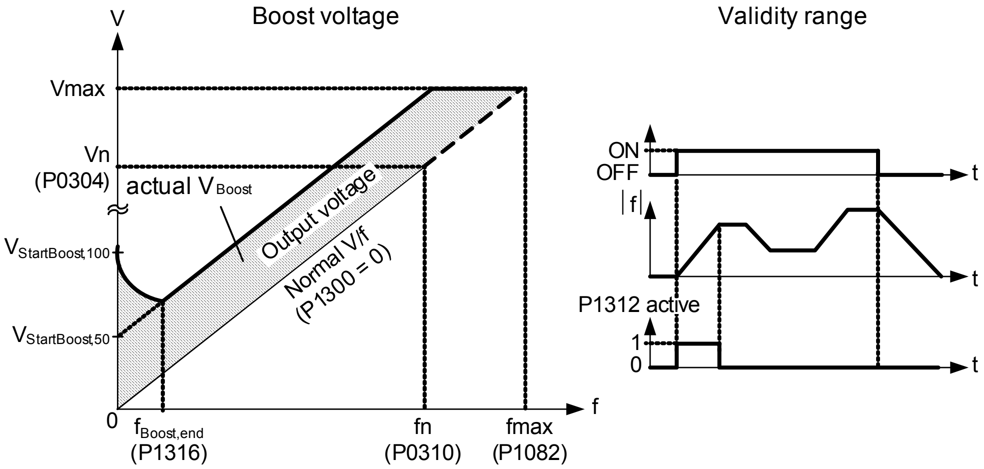
See parameter P1310

P1312[3]	**Starting boost**				**Min:** 0.0	Level
	CStat: CUT		**Datatype:** Float	**Unit:** %	**Def:** 0.0	**2**
	P-Group: CONTROL		**Active:** Immediately	**QuickComm.:** No	**Max:** 250.0	

Applies a constant linear offset (in [%] relative to P0305 (rated motor current)) to active V/f curve (either linear or quadratic) after an ON command and is active until
1) ramp output reaches setpoint for the first time respectively
2) setpoint is reduced to less than present ramp output

This is useful for starting loads with high inertia.

Setting the starting boost (P1312) too high will cause the inverter to limit the current, which will in turn restrict the output frequency to below the setpoint frequency.



where voltage values are given

$$V_{StartBoost,100} = P0305 \cdot P0350 \cdot \frac{P1312}{100}$$

$$V_{StartBoost,50} = \frac{V_{StartBoost,100}}{2}$$

Index:

P1312[0] : 1st. Drive data set (DDS)
P1312[1] : 2nd. Drive data set (DDS)
P1312[2] : 3rd. Drive data set (DDS)

Example:

Setpoint = 50Hz. Ramping up with starting boost. During ramp up, setpoint changed to 20Hz. As soon as setpoint changed, starting boost removed because setpoint smaller than present ramp output.

Dependency:

Acceleration boost P1312 has no effect during vector operation.

Note:

See parameter P1310

r1315	**CO: Total boost voltage**			**Min:** -	Level
		Datatype: Float	**Unit:** V	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays total value of voltage boost (in volts).

P1316[3]	**Boost end frequency**				**Min:**	0.0	Level
	CStat:	CUT	**Datatype:** Float	**Unit:** %	**Def:**	20.0	**3**
	P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	100.0	

Defines point at which programmed boost reaches 50 % of its value. This value is expressed in [%] relative to P0310 (rated motor frequency).

The default frequency is defined as follows:

$$f_{Boostmin} = 2 \cdot \left(\frac{153}{\sqrt{P_{motor}}} + 3\right)$$

Index:

P1316[0] : 1st. Drive data set (DDS)
P1316[1] : 2nd. Drive data set (DDS)
P1316[2] : 3rd. Drive data set (DDS)

Note:

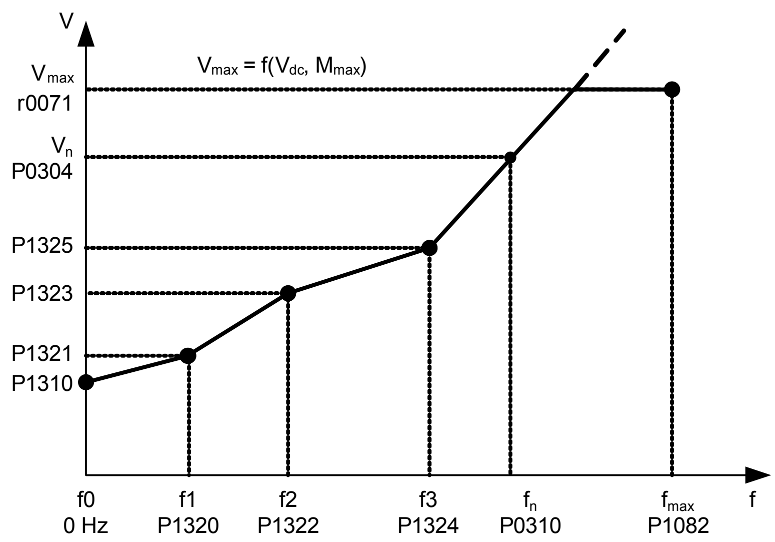
- The expert user may change this value to alter the shape of the curve, e.g. to increase torque at a particular frequency.
- Default value is depending on inverter type and its rating data.

Details:

See diagram in P1310 (continuous boost).

P1320[3]	**Programmable V/f freq. coord. 1**				**Min:**	0.00	Level
	CStat:	CT	**Datatype:** Float	**Unit:** Hz	**Def:**	0.00	**3**
	P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

Sets V/f coordinates (P1320/1321 to P1324/1325) to define V/f characteristic.



$$P1310[V] = \frac{P1310[\%]}{100[\%]} \cdot \frac{r0395[\%]}{100[\%]} \cdot P0304[V]$$

Index:

P1320[0] : 1st. Drive data set (DDS)
P1320[1] : 2nd. Drive data set (DDS)
P1320[2] : 3rd. Drive data set (DDS)

Example:

This parameter can be used to provide correct torque at correct frequency and is useful when used with synchronous motors.

Dependency:

To set parameter, select P1300 = 3 (V/f with programmable characteristic).

Note:

Linear interpolation will be applied between the individual data points.

V/f with programmable characteristic (P1300 = 3) has 3 programmable points. The two non-programmable points are:

- Continuous boost P1310 at zero 0 Hz
- Rated motor voltage P0304 at rated motor frequency P0310

The acceleration boost and starting boost defined in P1311 and P1312 are applied to V/f with programmable characteristic.

P1321[3]	**Programmable V/f volt. coord. 1**			**Min:**	0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** V	**Def:**	0.0	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	3000.0	

See P1320 (programmable V/f freq. coord. 1).

Index:

P1321[0] : 1st. Drive data set (DDS)
P1321[1] : 2nd. Drive data set (DDS)
P1321[2] : 3rd. Drive data set (DDS)

P1322[3]	**Programmable V/f freq. coord. 2**			**Min:**	0.00	Level
	CStat: CT	**Datatype:** Float	**Unit:** Hz	**Def:**	0.00	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

See P1320 (programmable V/f freq. coord. 1).

Index:

P1322[0] : 1st. Drive data set (DDS)
P1322[1] : 2nd. Drive data set (DDS)
P1322[2] : 3rd. Drive data set (DDS)

P1323[3]	**Programmable V/f volt. coord. 2**			**Min:**	0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** V	**Def:**	0.0	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	3000.0	

See P1320 (programmable V/f freq. coord. 1).

Index:

P1323[0] : 1st. Drive data set (DDS)
P1323[1] : 2nd. Drive data set (DDS)
P1323[2] : 3rd. Drive data set (DDS)

P1324[3]	**Programmable V/f freq. coord. 3**			**Min:**	0.00	Level
	CStat: CT	**Datatype:** Float	**Unit:** Hz	**Def:**	0.00	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

See P1320 (programmable V/f freq. coord. 1).

Index:

P1324[0] : 1st. Drive data set (DDS)
P1324[1] : 2nd. Drive data set (DDS)
P1324[2] : 3rd. Drive data set (DDS)

P1325[3]	**Programmable V/f volt. coord. 3**			**Min:**	0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** V	**Def:**	0.0	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	3000.0	

See P1320 (programmable V/f freq. coord. 1).

Index:

P1325[0] : 1st. Drive data set (DDS)
P1325[1] : 2nd. Drive data set (DDS)
P1325[2] : 3rd. Drive data set (DDS)

P1330[3]	**CI: Voltage setpoint**			**Min:**	0:0	Level
	CStat: T	**Datatype:** U32	**Unit:** -	**Def:**	0:0	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:**	4000:0	

BICO parameter for selecting source of voltage setpoint for independent V/f control.

Index:

P1330[0] : 1st. Command data set (CDS)
P1330[1] : 2nd. Command data set (CDS)
P1330[2] : 3rd. Command data set (CDS)

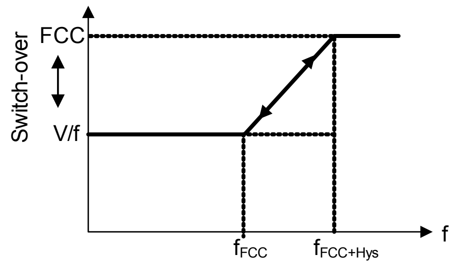
P1333[3]	**Start frequency for FCC**			**Min:**	0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	10.0	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	100.0	

Defines the FCC starting frequency as a percentage of the rated motor frequency (P0310).

When FCC is activated using P1300 = 1, then as a function of the FCC starting frequency plus hysteresis and the actual frequency, a changeover is made with a continuous transition between the linear V/f characteristic (P1300 = 0) and FCC (refer to the diagram).

$$f_{FCC} = \frac{P0310}{100} \cdot P1333$$

$$f_{FCC+Hys} = \frac{P0310}{100} \cdot (P1333 + 6\%)$$



Index:

P1333[0] : 1st. Drive data set (DDS)
P1333[1] : 2nd. Drive data set (DDS)
P1333[2] : 3rd. Drive data set (DDS)

Notice:

- A value that is excessively low can result in instability.
- The constant voltage boost P1310 is continuously de-activated - essentially the same as when switching-in FCC.
- Contrary, the voltage boosts P1311 and P1312 remain active over the complete frequency range.

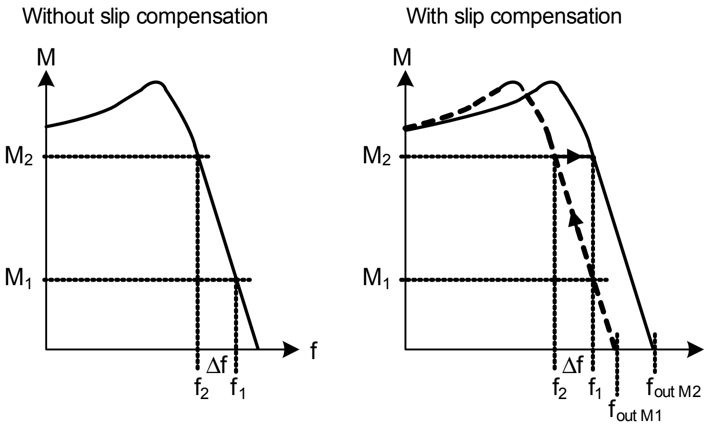
3.29.1.1 Slip compensation

P1335[3]	**Slip compensation**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 0.0	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 600.0	

Dynamically adjusts output frequency of inverter so that motor speed is kept constant independent of motor load.

In the V/f-control, the motor speed will always be less than the command speed due to the slip speed. For a given speed command, the speed will drop as load is increased. The speed regulation of drive can be improved by the technique known as slip compensation.

Increasing the load from M1 to M2 (see diagram) will decrease the motor speed from f1 to f2, due to the slip. The inverter can compensate for this by increasing the output frequency slightly as the load increases. The inverter measures the current and increases the output frequency to compensate for the expected slip.



Index:

P1335[0] : 1st. Drive data set (DDS)
P1335[1] : 2nd. Drive data set (DDS)
P1335[2] : 3rd. Drive data set (DDS)

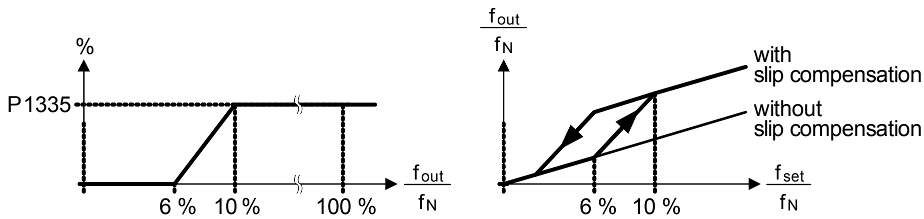
Value:

P1335 = 0 % :
Slip compensation disabled.

P1335 = 50 % - 70 % :
Full slip compensation at cold motor (partial load).

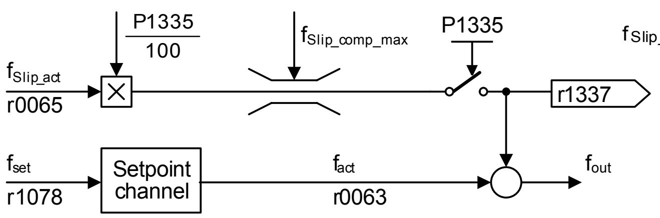
P1335 = 100 % :
Full slip compensation at warm motor (full load).

Range of slip compensation :



Notice:

The applied value of the slip compensation (scaled by P1335) is limited by following equation:



$$f_{Slip_comp_max} = \frac{P1336}{100} \cdot r0330$$

P1336[3]	**Slip limit**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** %	**Def:** 250	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 600	

Compensation slip limit in [%] relative to r0330 (rated motor slip), which is added to frequency setpoint.

Index:

P1336[0] : 1st. Drive data set (DDS)
P1336[1] : 2nd. Drive data set (DDS)
P1336[2] : 3rd. Drive data set (DDS)

Dependency:

Slip compensation (P1335) active.

r1337	**CO: V/f slip frequency**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays actual compensated motor slip as [%]

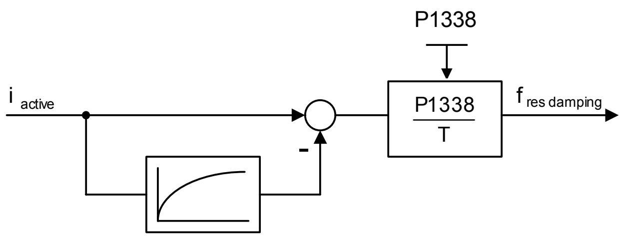
Dependency:

Slip compensation (P1335) active.

3.29.1.2 Resonance damping

P1338[3]	**Resonance damping gain V/f**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 0.00	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 10.00	

Defines resonance damping gain for V/f. Here, di/dt of the acitve current will be scaled by P1338 (see diagram below). If di/dt increases the resonance damping circuit decreases the inverter output frequency.



Index:

P1338[0] : 1st. Drive data set (DDS)
P1338[1] : 2nd. Drive data set (DDS)
P1338[2] : 3rd. Drive data set (DDS)

Note:

- The resonance damping function is used to dampen oscillations in the active current. These especially occur when rotating field motors are operating under no-load conditions. The parameter is not used to optimize the stabilizing behavior.
- In the V/f control modes (refer to P1300), the resonance damping controller is activate in a range from approximately 5 % up to 70 % of the rated motor frequency (P0310).
- An excessively high value results in instability (positive feedback).

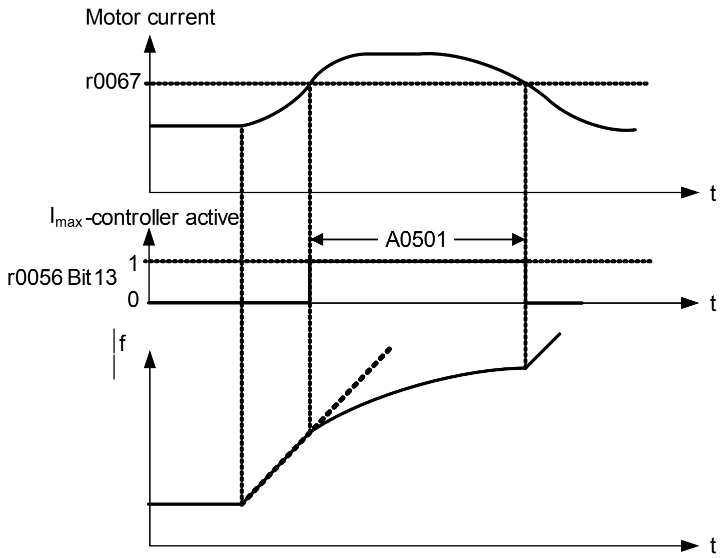
3.29.1.3 Imax controller

P1340[3]	**Imax freq. controller prop. gain**			**Min:** 0.000	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 0.000	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 0.499	

Proportional gain of the I_max frequency controller.

The Imax controller reduces inverter current if the output current exceeds the maximum motor current (r0067).

In linear V/f, parabolic V/f, FCC, and programmable V/f modes the I_max controller uses both a frequency controller (see parameters P1340 and P1341) and a voltage controller (see parameters P1345 and P1346). The frequency controller seeks to reduce current by limiting the inverter output frequency (to a minimum of the two times nominal slip frequency). If this action does not successfully remove the overcurrent condition, the inverter output voltage is reduced using the I_max voltage controller. When the overcurrent condition has been removed successfully, frequency limiting is removed using the ramp-up time set in P1120.



In linear V/f for textiles, FCC for textiles, or external V/f modes only the I_max voltage controller is used to reduce current (See parameters P1345 and P1346).

Index:

P1340[0] : 1st. Drive data set (DDS)
P1340[1] : 2nd. Drive data set (DDS)
P1340[2] : 3rd. Drive data set (DDS)

Note:

The I_max controller can be disabled by setting the frequency controller integral time P1341 to zero. This disables both the frequency and voltage controllers. Note that when disabled, the I_max controller will take no action to reduce current but overcurrent warnings will still be generated, and the Drive will trip in excessive overcurrent or overload conditions.

P1341[3]	**Imax freq. ctrl. integral time**			**Min:** 0.000	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 0.300	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 50.000	

Integral time constant of the I_max controller.

P1341 = 0 :
I_max frequency and voltage controllers disabled

P1340 = 0 and P1341 > 0 :
frequency controller enhanced integral

P1340 > 0 and P1341 > 0 :
frequency controller normal PI control

See description in parameter P1340 for further information.

Index:

P1341[0] : 1st. Drive data set (DDS)
P1341[1] : 2nd. Drive data set (DDS)
P1341[2] : 3rd. Drive data set (DDS)

r1343	**CO: Imax controller freq. output**			**Min:**	-	Level
		Datatype: Float	**Unit:** Hz	**Def:**	-	**3**
	P-Group: CONTROL			**Max:**	-	

Displays effective frequency limitation.

Dependency:

If I_max controller not in operation, parameter normally shows max. frequency P1082.

r1344	**CO: Imax controller volt. output**			**Min:**	-	Level
		Datatype: Float	**Unit:** V	**Def:**	-	**3**
	P-Group: CONTROL			**Max:**	-	

Displays amount by which the I_max controller is reducing the inverter output voltage.

P1345[3]	**Imax voltage ctrl. prop. gain**			**Min:**	0.000	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:**	0.250	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	5.499	

Proportional gain of the I_max voltage controller. See parameter P1340 for further information.

Index:

P1345[0] : 1st. Drive data set (DDS)
P1345[1] : 2nd. Drive data set (DDS)
P1345[2] : 3rd. Drive data set (DDS)

P1346[3]	**Imax voltage ctrl. integral time**			**Min:**	0.000	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:**	0.300	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	50.000	

Integral time constant of the I_max voltage controller.

P1341 = 0 :
I_max frequency and voltage controllers disabled.

P1345 = 0 and P1346 > 0 :
I_max voltage controller enhanced integral

P1345 > 0 and P1346 > 0 :
I_max voltage controller normal PI control

See description in parameter P1340 for further information.

Index:

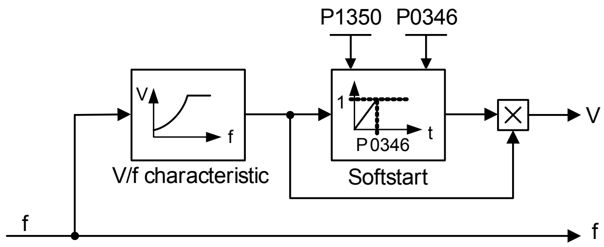
P1346[0] : 1st. Drive data set (DDS)
P1346[1] : 2nd. Drive data set (DDS)
P1346[2] : 3rd. Drive data set (DDS)

3.29.1.4 Soft starting

P1350[3]	**Voltage soft start**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:** 1	

Selecting the soft starting function.

With soft starting, the flux in the motor is established with some delay. This ensures that the motor only rotates in the required direction of rotation even with existing residual magnetism. When activated, at powered-on, the output voltage is ramped-up to the value of the characteristic voltage within the magnetizing time P0346.



Possible Settings:
0 OFF
1 ON

Index:
P1350[0] : 1st. Drive data set (DDS)
P1350[1] : 2nd. Drive data set (DDS)
P1350[2] : 3rd. Drive data set (DDS)

Note:

The settings for this parameter bring benefits and drawbacks:
- P1350 = 0: (jump to boost voltage)
  Benefit: flux is built up quickly
  Drawback: motor may move
- P1350 = 1: (smooth voltage build-up)
  Benefit: motor less likely to move
  Drawback: flux build-up takes longer

3.29.2 Field-orientated vector control

P1400[3]	**Configuration of speed control**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 1	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 3	

Configuration for speed control.

Bitfields:

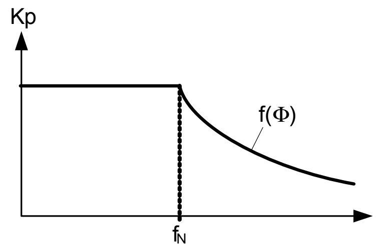
```
Bit00   Automatic Kp adaption          0  NO      1  YES
Bit01   Integral freeze (SLVC)         0  NO      1  YES
```

Index:

P1400[0] : 1st. Drive data set (DDS)
P1400[1] : 2nd. Drive data set (DDS)
P1400[2] : 3rd. Drive data set (DDS)

Note:

P1400 Bit 00 = 1:
Automatic gain adaption of speed controller is enabled. In the area of field weakening the gain is reduced in dependence on flux.



P1400 Bit01 = 1:
The integrator of the speed controller is frozen if Sensorless Vector Control (SLVC) is selected and the control is switched from closed-loop to open-loop operation.
Advantage:
The correct amount of slip compensation is calculated and applied to the open-loop function for a motor under load.

r1407	**CO/BO: Status 2 of motor control**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays status of motor control, which can be used to diagnose inverter status.

Bitfields:

```
Bit00   V/f control enable             0  NO      1  YES
Bit01   SLVC enable                    0  NO      1  YES
Bit02   Torque control enable          0  NO      1  YES
Bit05   Stop I-comp. speed control     0  NO      1  YES

Bit06   Set I-comp. speed controller   0  NO      1  YES
Bit08   Upper torque limit active      0  NO      1  YES
Bit09   Lower torque limit active      0  NO      1  YES
Bit10   Enable droop                   0  NO      1  YES
Bit15   DDS change active              0  NO      1  YES
```

Details:

See P052 (CO/BO: Status word 1)

r1438	**CO: Freq. setpoint to controller**			**Min:** -	Level
		Datatype: Float	**Unit:** Hz	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays setpoint of speed controller.

3.29.2.1 Speed controller with/without encoder

P1442[3]	**Filter time for act. speed**			**Min:** 0	evel
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 4	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 32000	

Sets time constant of PT1 filter to smooth actual speed of speed controller.

Index:

P1442[0] : 1st. Drive data set (DDS)
P1442[1] : 2nd. Drive data set (DDS)
P1442[2] : 3rd. Drive data set (DDS)

r1445	**CO: Act. filtered frequency 2**			**Min:** -	Level
		Datatype: Float	**Unit:** Hz	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays filtered actual frequency at speed controller input.

P1452[3]	**Filter time for act. freq (SLVC)**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 4	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 32000	

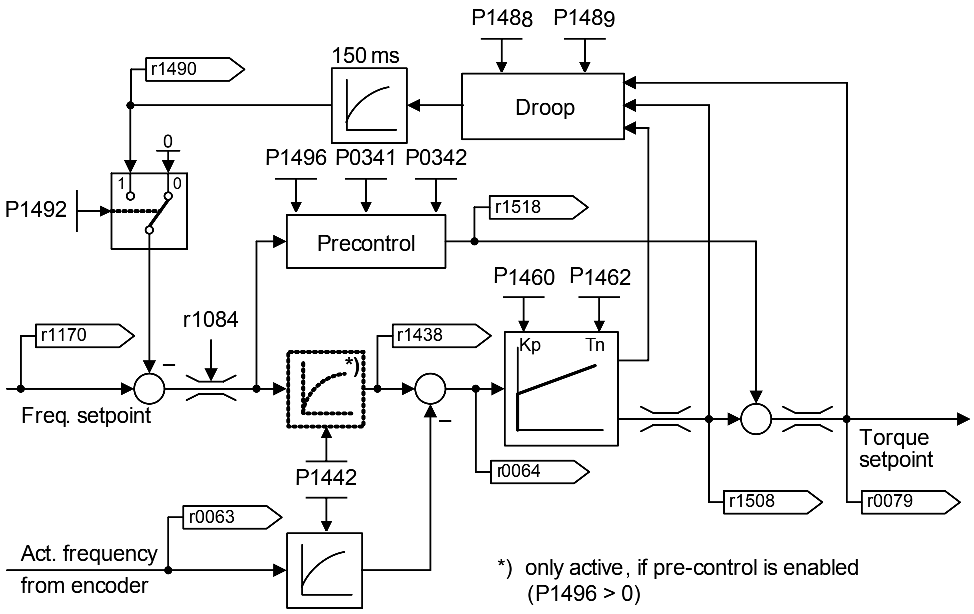
Sets time constant of PT1 filter to filter the frequency deviation of speed controller in operation mode SLVC (sensorless vector control).

Index:

P1452[0] : 1st. Drive data set (DDS)
P1452[1] : 2nd. Drive data set (DDS)
P1452[2] : 3rd. Drive data set (DDS)

P1460[3]	**Gain speed controller**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 3.0	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 2000.0	

Enters gain of speed controller.



Index:

P1460[0] : 1st. Drive data set (DDS)
P1460[1] : 2nd. Drive data set (DDS)
P1460[2] : 3rd. Drive data set (DDS)

P1462[3]	**Integral time speed controller**			**Min:** 25	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 400	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 32001	

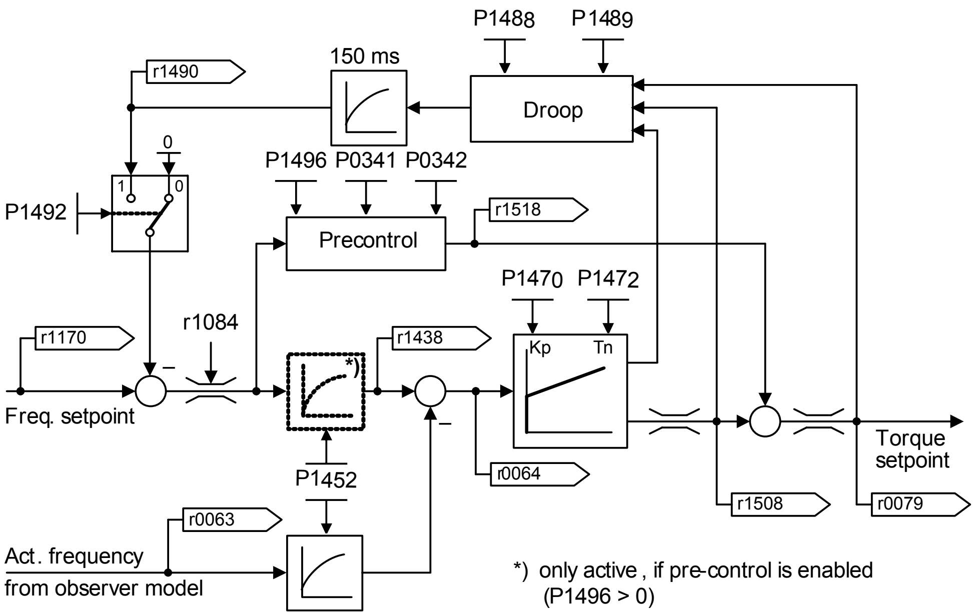
Enters integral time of speed controller.

Index:

P1462[0] : 1st. Drive data set (DDS)
P1462[1] : 2nd. Drive data set (DDS)
P1462[2] : 3rd. Drive data set (DDS)

P1470[3]	**Gain speed controller (SLVC)**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 3.0	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 2000.0	

Enters gain of speed controller for sensorless vector control (SLVC).



Index:

P1470[0] : 1st. Drive data set (DDS)
P1470[1] : 2nd. Drive data set (DDS)
P1470[2] : 3rd. Drive data set (DDS)

P1472[3]	**Integral time n-ctrl. (SLVC)**			**Min:** 25	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 400	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 32001	

Enters integral time of speed controller for sensorless vector control (SLVC).

Index:

P1472[0] : 1st. Drive data set (DDS)
P1472[1] : 2nd. Drive data set (DDS)
P1472[2] : 3rd. Drive data set (DDS)

P1477[3]	**BI: Set integrator of n-ctrl.**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Selects source to read in command to enable speed controller.

Index:

P1477[0] : 1st. Command data set (CDS)
P1477[1] : 2nd. Command data set (CDS)
P1477[2] : 3rd. Command data set (CDS)

P1478[3]	**CI: Set integrator value n-ctrl.**			**Min:** 0:0	Level
	CStat: UT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Selects source for integral part of speed controller.

Index:

P1478[0] : 1st. Command data set (CDS)
P1478[1] : 2nd. Command data set (CDS)
P1478[2] : 3rd. Command data set (CDS)

Dependency:

In case of sensorless vector control, integrator freezing must be selected (Bit 1 "Integral freeze (SLVC)" of P1400 has to be set) to save the integrator output.

Note:

- If the setting command is not connected (P1477=0), a pending value is read in after pulse enable at the end of the excitation time (P0346) and the integral component of the speed controller is set once.
- If the P1482 (integral component of speed controller) is connected upon pulse enable, the integral component of the controller is set to the last value prior the pulse inhibit.
- Neither function works after flying start.

r1482	**CO: Integral output of n-ctrl.**			**Min:** -	Level
		Datatype: Float	**Unit:** Nm	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

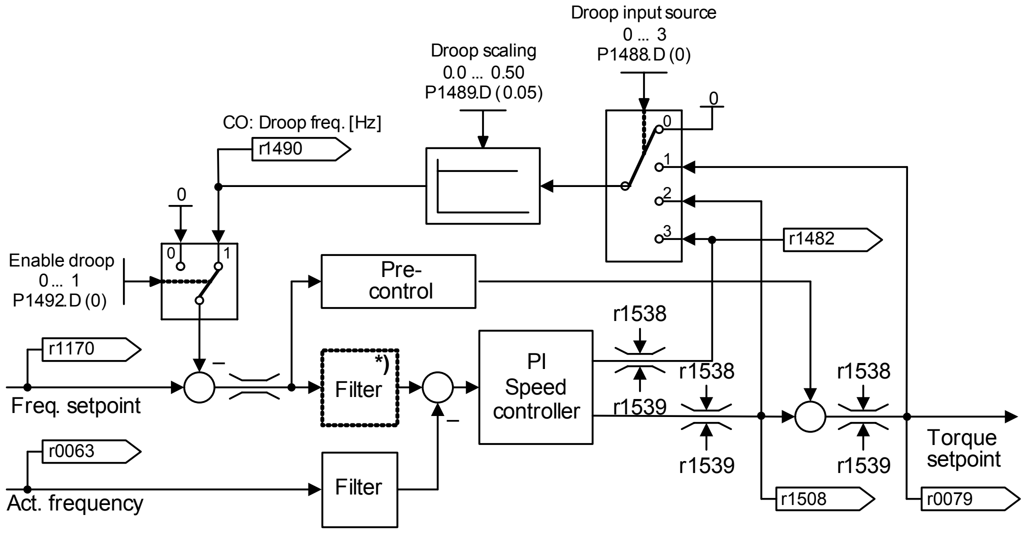
Displays integral part of speed controller output.

3.29.2.2 Droop

P1488[3]	**Droop input source**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:** 3	

Selects source of droop input signal.

With mechanically coupled motors it is very important that an even load distribution is applied to each motor. The load sharing can be achieved by enabling the droop function on both inverters.



*) only active, if pre-control is enabled (P1496 > 0)

1. Droop is applied as a frequency setpoint on each inverter.
   The droop increases the slip via the negative feedback of the torque setpoint to the frequency setpoint. In a steady-state an even load distribution can be achieved if the slip characteristics are identical.
   - P1488 > 0
   - P1489 > 0
   - P1492 = 1

2. Droop can act as a setpoint or limitation for a group of inverters (i.e. master-slave inverters)
   By use of the master-slave inverter technique an even load distribution is achieved across the whole application.
   This is accomplished by setting the torque setpoint (r1490) on the master inverter which then controls the frequency of the master inverter and all connected slave inverters.
   - P1488 > 0
   - P1489 > 0
   - P1492 = 0

Possible Settings:

0 Droop input disabled
1 Torque setpoint
2 Speed controller output
3 Speed controller integral output

Index:

P1488[0] : 1st. Drive data set (DDS)
P1488[1] : 2nd. Drive data set (DDS)
P1488[2] : 3rd. Drive data set (DDS)

Dependency:

Droop scaling (P1489) must be > 0 for droop to be effective.

P1489[3]	**Droop scaling**			**Min:**	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:**	0.05	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	0.50	

Defines amount of droop in per unit at full load in [%].

Index:

P1489[0] : 1st. Drive data set (DDS)
P1489[1] : 2nd. Drive data set (DDS)
P1489[2] : 3rd. Drive data set (DDS)

Note:

If 0 is entered as value, no droop is applied.

r1490	**CO: Droop frequency**			**Min:**	-	Level
		Datatype: Float	**Unit:** Hz	**Def:**	-	**3**
	P-Group: CONTROL			**Max:**	-	

Displays output signal of droop function.

This result of droop calculation is subtracted from the speed controller setpoint.

P1492[3]	**Enable droop**			**Min:**	0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:**	0	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:**	1	

Enables droop.

Possible Settings:

0 Disabled
1 Enabled

Index:

P1492[0] : 1st. Drive data set (DDS)
P1492[1] : 2nd. Drive data set (DDS)
P1492[2] : 3rd. Drive data set (DDS)

Dependency:

Effective only if droop scaling P1489 > 0.

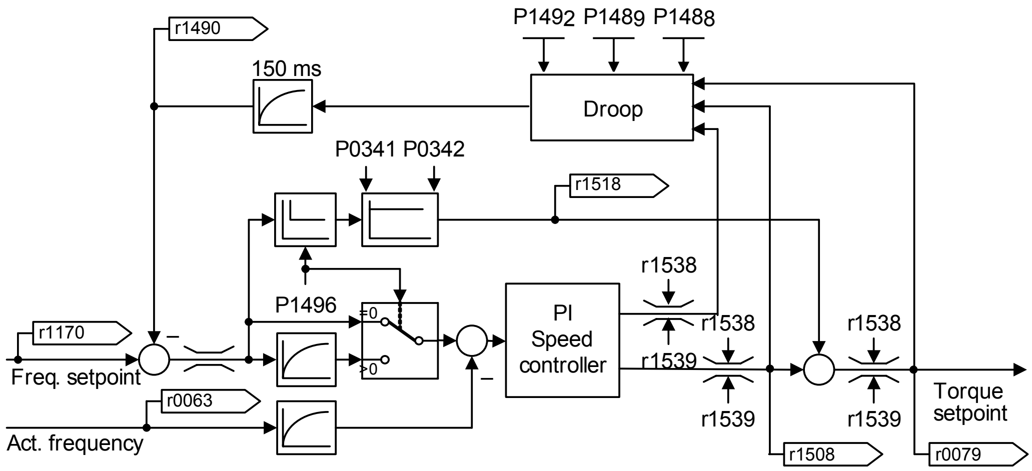
3.29.2.3 Speed controller pre-control

P1496[3] **Scaling accel. precontrol**

				Min:	0.0	Level
CStat:	CUT	**Datatype:** Float	**Unit:** %	**Def:**	0.0	**3**
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	400.0	

Enters scaling of acceleration in [%].

The response of setpoint changes for the speed control loop can be improved using the precontrol function (P1496). Precontrol is derived from the differential frequency setpoint multiplied by the mass inertia P0341; P0342 is then supplied as a torque setpoint to the current controller. If the filter (VC: P1442, SLVC: P1452) is applied in the correct manner, the derived speed controller is only required to control a small deviation in the value of the corrected variable. Setpoint changes are then passed by the speed controller and are quickly executed.



Index:

P1496[0] : 1st. Drive data set (DDS)
P1496[1] : 2nd. Drive data set (DDS)
P1496[2] : 3rd. Drive data set (DDS)

Note:

P1496 = 0:
Precontrol disabled

P1496 > 0:
Precontrol enabled

P1496 = 100:
Standard setting for precontrol

P1499[3] **Scaling accel. torque control**

				Min:	0.0	Level
CStat:	CUT	**Datatype:** Float	**Unit:** %	**Def:**	100.0	**3**
P-Group:	CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:**	400.0	

Enters scaling of acceleration in [%] for sensorless torque control (SLVC) at low frequencies.

Index:

P1499[0] : 1st. Drive data set (DDS)
P1499[1] : 2nd. Drive data set (DDS)
P1499[2] : 3rd. Drive data set (DDS)

3.29.2.4 Torque control

P1500[3]	**Selection of torque setpoint**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** Yes	**Max:** 77	

Selects torque setpoint source. In the table of possible settings below, the main setpoint is selected from the least significant digit (i.e., 0 to 7) and any additional setpoint from the most significant digit (i.e., x0 through to x7).

Possible Settings:

0 No main setpoint
2 Analog setpoint
4 USS on BOP link
5 USS on COM link
6 CB on COM link
7 Analog setpoint 2
20 No main setpoint + Analog setpoint
22 Analog setpoint + Analog setpoint
24 USS on BOP link + Analog setpoint
25 USS on COM link + Analog setpoint
26 CB on COM link + Analog setpoint
27 Analog setpoint 2 + Analog setpoint
40 No main setpoint + USS on BOP link
42 Analog setpoint + USS on BOP link
44 USS on BOP link + USS on BOP link
45 USS on COM link + USS on BOP link
46 CB on COM link + USS on BOP link
47 Analog setpoint 2 + USS on BOP link
50 No main setpoint + USS on COM link
52 Analog setpoint + USS on COM link
54 USS on BOP link + USS on COM link
55 USS on COM link + USS on COM link
57 Analog setpoint 2 + USS on COM link
60 No main setpoint + CB on COM link
62 Analog setpoint + CB on COM link
64 USS on BOP link + CB on COM link
66 CB on COM link + CB on COM link
67 Analog setpoint 2 + CB on COM link
70 No main setpoint + Analog setpoint 2
72 Analog setpoint + Analog setpoint 2
74 USS on BOP link + Analog setpoint 2
75 USS on COM link + Analog setpoint 2
76 CB on COM link + Analog setpoint 2
77 Analog setpoint 2 + Analog setpoint 2

Index:

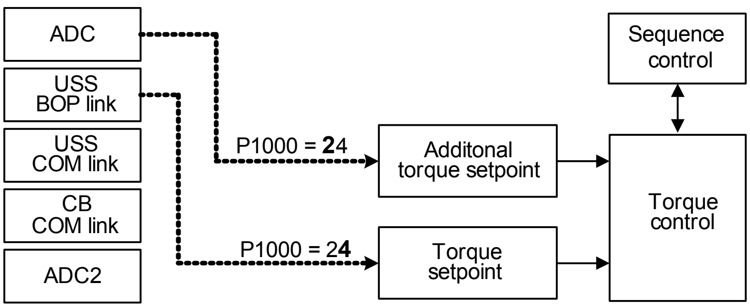
P1500[0] : 1st. Command data set (CDS)
P1500[1] : 2nd. Command data set (CDS)
P1500[2] : 3rd. Command data set (CDS)

Example:

Setting 24 selects the main setpoint (4) derived from the USS on BOP link with the additional setpoint (2) derived from the analog input. Single digits are main setpoints only with no additional setpoint.

Example P1500 = 24 :

P1500 = **2**4 ⇒ P1503 = 755.0	P1503 CI: Torque setpoint
	r0755 CO: Act. ADC after scal. [4000h]
P1500 = 2**4** ⇒ P1511 = r2015.1	P1511 CI: Additional torque setpoint
	r2015 CO: PZD from BOP link (USS)



Caution:

Be aware, by changing of parameter P1500 all BICO parameters (see table below) are modified.

Note:

Changing this parameter sets (to default) all settings on item selected (see table).

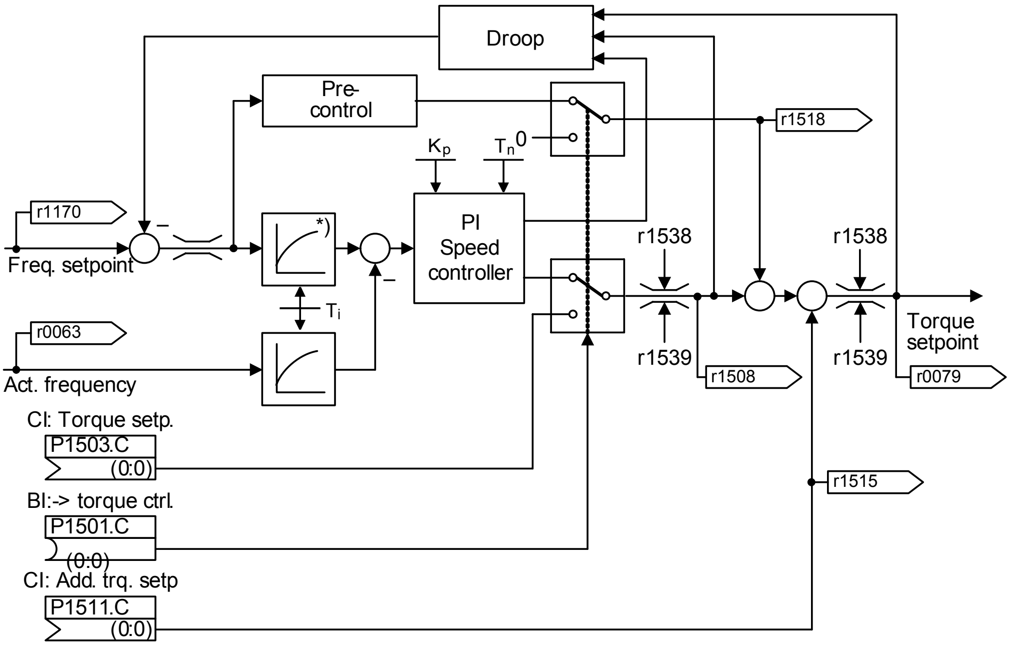
P1500 = xy		y = 0	y = 2	y = 4	y = 5	y = 6	y = 7	
	x = 0	0.0	755.0	2015.1	2018.1	2050.1	755.1	P1503
		0.0	0.0	0.0	0.0	0.0	0.0	P1511
	x = 2	0.0	755.0	2015.1	2018.1	2050.1	755.1	P1503
		755.0	755.0	755.0	755.0	755.0	755.0	P1511
	x = 4	0.0	755.0	2015.1	2018.1	2050.1	755.1	P1503
		2015.1	2015.1	2015.1	2015.1	2015.1	2015.1	P1511
	x = 5	0.0	755.0	2015.1	2018.1		755.1	P1503
		2018.1	2018.1	2018.1	2018.1		2018.1	P1511
	x = 6	0.0	755.0	2015.1		2050.1	755.1	P1503
		2050.1	2050.1	2050.1		2050.1	2050.1	P1511
	x = 7	0.0	755.0	2015.1	2018.1	2050.1	755.1	P1503
		755.1	755.1	755.1	755.1	755.1	755.1	P1511

Example:

P1500 = 24 → P1503 = 2015.1
P1511 = 755.0

P1501[3]	**BI: Change to torque control**				**Min:**	0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -		**Def:**	0:0	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No		**Max:**	4000:0	

Selects command source from which it is possible to change between master (speed control) and slave (torque control).



*) only active, if pre-control is enabled
(P1496 > 0)

	T_i	K_p	T_n
SLVC:	P1452	P1470	P1472
VC:	P1442	P1460	P1462

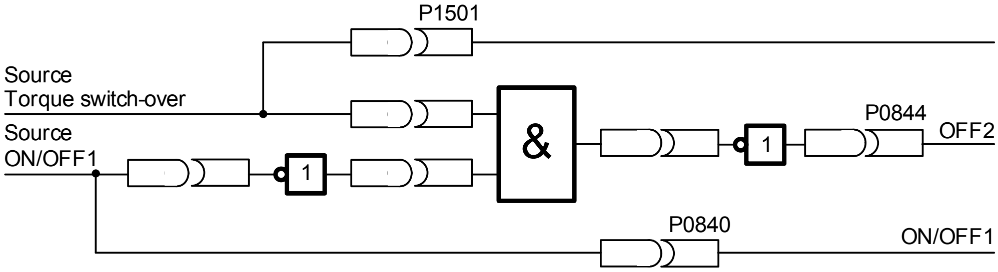
Index:

P1501[0] : 1st. Command data set (CDS)
P1501[1] : 2nd. Command data set (CDS)
P1501[2] : 3rd. Command data set (CDS)

Caution:

If direct selection of torque control is used (P1300=22, 23) the OFF1 command is recognized as OFF2.

However, the OFF1 command is not recognized when torque control is selected indirectly (P1300=20, 21 and P1501=1). If indirect selection of torque control is used, it is recommended to program an OFF2 command using, for example a digital input or create the following circuit using the Free Function Blocks (FFB):



Details:

Speed control with encoder feedback see P1460
Speed control without encoder feedback see P1470

P1503[3]	**CI: Torque setpoint**			Min: 0:0	Level
	CStat: T	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Selects source of torque setpoint for torque control.

Index:

P1503[0] : 1st. Command data set (CDS)
P1503[1] : 2nd. Command data set (CDS)
P1503[2] : 3rd. Command data set (CDS)

Details:

See parameter P1501.

r1508	**CO: Torque setpoint**			Min: -	Level
		Datatype: Float	**Unit:** Nm	**Def:** -	**2**
	P-Group: CONTROL			**Max:** -	

Displays torque setpoint before limitation.

Details:

See parameter P1501.

3.29.2.5 Supplementary torque setpoint

P1511[3]	**CI: Additional torque setpoint**			Min: 0:0	Level
	CStat: T	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Selects source of additional torque setpoint for torque and speed control.

Index:

P1511[0] : 1st. Command data set (CDS)
P1511[1] : 2nd. Command data set (CDS)
P1511[2] : 3rd. Command data set (CDS)

Details:

See parameter P1501.

r1515	**CO: Additional torque setpoint**			Min: -	Level
		Datatype: Float	**Unit:** Nm	**Def:** -	**2**
	P-Group: CONTROL			**Max:** -	

Displays additional torque setpoint.

Details:

See parameter P1501.

r1518	**CO: Acceleration torque**			Min: -	Level
		Datatype: Float	**Unit:** Nm	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays acceleration torque.

Details:

See parameter P1501.

P1520[3]	**CO: Upper torque limit**			Min: -99999.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Nm	**Def:** 5.13	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 99999.00	

Specifies fixed value for upper torque limitation.

$$P1520_{def} = 1.5 \cdot r0333$$
$$P1520_{max} = \pm 4 \cdot r0333$$

Index:

P1520[0] : 1st. Drive data set (DDS)
P1520[1] : 2nd. Drive data set (DDS)
P1520[2] : 3rd. Drive data set (DDS)

3.29.2.6 Torque / power limiting

P1521[3] **CO: Lower torque limit**

CStat: CUT	**Datatype:** Float	**Unit:** Nm	**Min:** -99999.00	**Def:** -5.13	Level **2**
P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 99999.00		

Enters fixed value of lower torque limitation.

$$P1521_{def} = -1.5 \cdot r0333$$
$$P1521_{max} = \pm 4 \cdot r0333$$

Index:
P1521[0] : 1st. Drive data set (DDS)
P1521[1] : 2nd. Drive data set (DDS)
P1521[2] : 3rd. Drive data set (DDS)

P1522[3] **CI: Upper torque limit**

CStat: T	**Datatype:** U32	**Unit:** -	**Min:** 0:0	**Def:** 1520:0	Level **3**
P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0		

Selects source of upper torque limitation.

Index:
P1522[0] : 1st. Command data set (CDS)
P1522[1] : 2nd. Command data set (CDS)
P1522[2] : 3rd. Command data set (CDS)

P1523[3] **CI: Lower torque limit**

CStat: T	**Datatype:** U32	**Unit:** -	**Min:** 0:0	**Def:** 1521:0	Level **3**
P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0		

Selects source of lower torque limitation.

Index:
P1523[0] : 1st. Command data set (CDS)
P1523[1] : 2nd. Command data set (CDS)
P1523[2] : 3rd. Command data set (CDS)

P1525[3] **Scaling lower torque limit**

CStat: CUT	**Datatype:** Float	**Unit:** %	**Min:** -400.0	**Def:** 100.0	Level **3**
P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 400.0		

Enters scaling of lower torque limitation in [%].

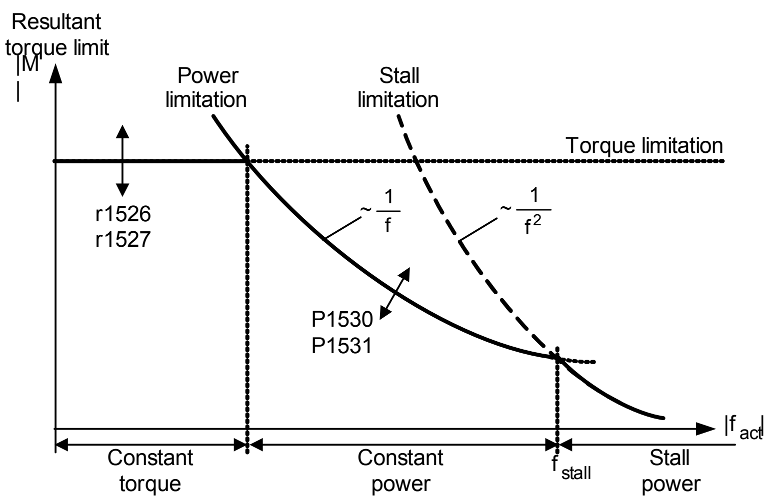
Index:
P1525[0] : 1st. Drive data set (DDS)
P1525[1] : 2nd. Drive data set (DDS)
P1525[2] : 3rd. Drive data set (DDS)

Note:
P1525 = 100 % = standard setting

r1526 **CO: Upper torque limitation**

	Datatype: Float	**Unit:** Nm	**Min:** -	Level **3**
P-Group: CONTROL			**Def:** -	
			Max: -	

Displays actual upper torque limitation.



Dependency:
The parameters r1526 and r1527 depend on P1520, P1521, P1522, P1523 and P1525.

r1527	**CO: Lower torque limitation**		**Min:** -	Level
		Datatype: Float	**Unit:** Nm	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays actual lower torque limitation.

Details:

See parameter r1526.

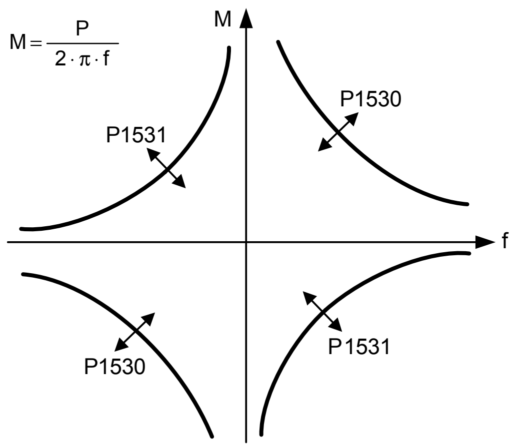
P1530[3]	**Motoring power limitation**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 0.12	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 8000.00	

Defines fixed value for the max. permissible motoring active power (motoring power limitation).

$$P1530_{def} = 2.5 \cdot P0307$$
$$P1530_{max} = 3 \cdot P0307$$

Parameter P1530 limits the torque in addition to the act. frequency as displayed in the following characteristic.

Power limitation (motoring, regenerative)



Index:

P1530[0] : 1st. Drive data set (DDS)
P1530[1] : 2nd. Drive data set (DDS)
P1530[2] : 3rd. Drive data set (DDS)

P1531[3]	**Regenerative power limitation**			**Min:** -8000.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** -0.12	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 0.00	

Enters fixed value for the max. permissible regenerative active power (regenerative power limitation).

$$P1531_{def} = -2.5 \cdot P0307$$
$$P1531_{max} = -3 \cdot P0307$$

Index:

P1531[0] : 1st. Drive data set (DDS)
P1531[1] : 2nd. Drive data set (DDS)
P1531[2] : 3rd. Drive data set (DDS)

Details:

See parameter P1530.

r1536	**CO: Max. trq. motoring current**			**Min:** -	Level
		Datatype: Float	**Unit:** A	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays maximum torque motoring current component.

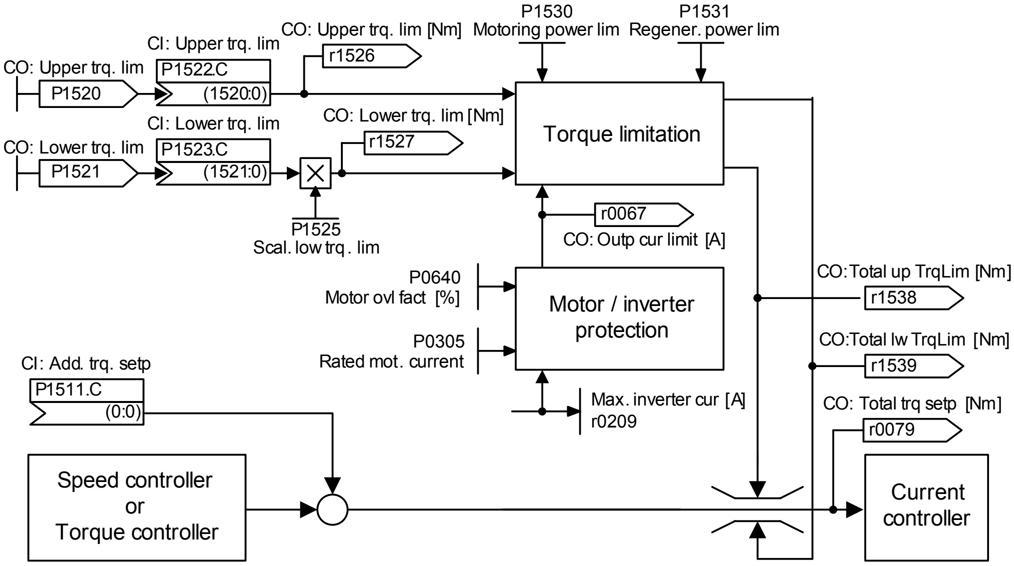
r1537	**CO: Max trq regenerative current**			**Min:** -	Level
		Datatype: Float	**Unit:** A	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays maximum torque of the regenerative current component.

r1538	**CO: Upper torque limit (total)**			**Min:** -	Level
		Datatype: Float	**Unit:** Nm	**Def:** -	**2**
	P-Group: CONTROL			**Max:** -	

Displays total upper torque limitation.

Torque limitation:



r1539	**CO: Lower torque limit (total)**			**Min:** -	Level
		Datatype: Float	**Unit:** Nm	**Def:** -	**2**
	P-Group: CONTROL			**Max:** -	

Displays total lower torque limitation.

Details:

See parameter r1538.

3.29.2.7 Flux control

P1570[3]	**CO: Fixed value flux setpoint**			**Min:** 50.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 107.0	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.0	

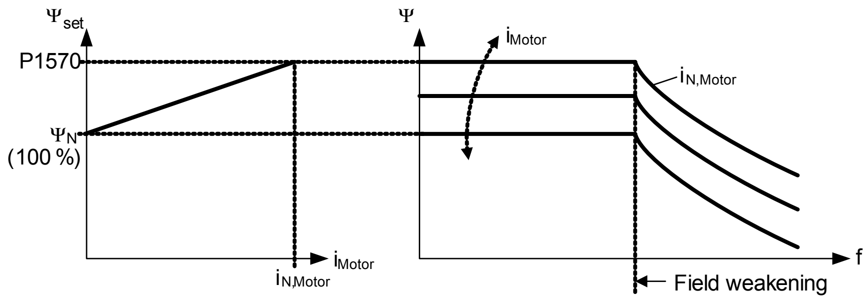
Parameter to set the flux setpoint as a % relative to the rated motor flux.

Index:

P1570[0] : 1st. Drive data set (DDS)
P1570[1] : 2nd. Drive data set (DDS)
P1570[2] : 3rd. Drive data set (DDS)

Note:

- In the base speed range, the flux setpoint P1570 is converted into the field-generating current component isd (P1570 = 100% corresponds to r0331).
- For values below 100%, the drive is under-magnetized and above this, is over-magnetized.
- If P1570 is set to more than 100%, then the flux setpoint, depending on the load, is increased from 100% (under no-load conditions) to this value (under rated load, refer to the diagram).
- If in so doing, the maximum drive inverter output voltage is reached, the rotor flux is reduced in order to keep the output voltage constant (or the EMF) with increasing speed.
- The maximum possible output voltage r0071 of the drive inverter is determined by the DC link voltage r0026 and the maximum modulation depth P1803 in the gating unit.



P1574[3]	**Dynamic voltage headroom**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** V	**Def:** 10	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 150	

Sets dynamic voltage headroom for vector control.

If max. output voltage is reached, the voltage headroom is used for balancing lead values and disturbances. Parameter P1574 gives a control-reserve, that is valid also in field weakening

Index:

P1574[0] : 1st. Drive data set (DDS)
P1574[1] : 2nd. Drive data set (DDS)
P1574[2] : 3rd. Drive data set (DDS)

Note:

- Increasing of the reserve decreases the maximum output voltage (r0071).
- Decreasing the voltage headroom can lead to instabilities of the control.

P1580[3]	**Efficiency optimization**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** %	**Def:** 0	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 100	

The efficiency for load-dependent magnetization can be optimized using parameter P1580.

P1580 = 0% :
No load-dependent magnetization (de-activated)

P1580 > 0% :
Load-dependent magnetization activated

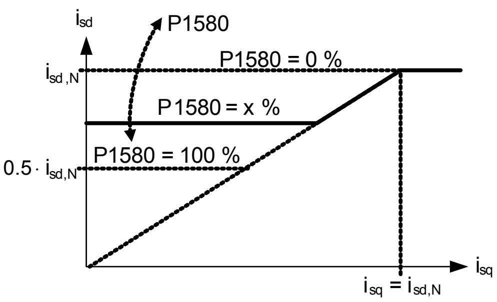
When the flux is decreased, the motor stator losses in the partial load range are reduced. When the load increases, the setpoint flux increases and therefore the magnetizing current corresponding to the torque-generating current.

Index:

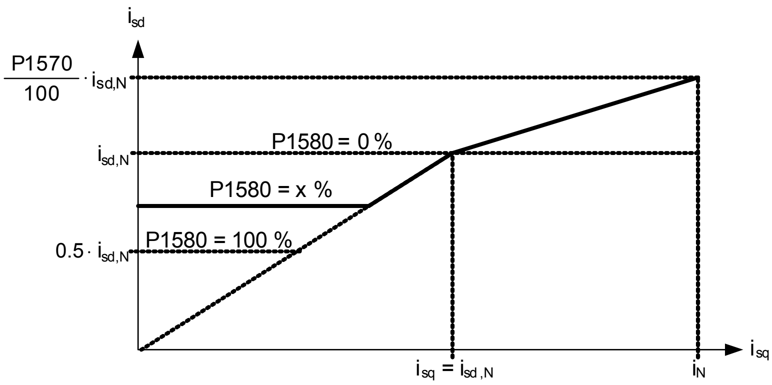
P1580[0] : 1st. Drive data set (DDS)
P1580[1] : 2nd. Drive data set (DDS)
P1580[2] : 3rd. Drive data set (DDS)

Note:

- When using the optimization routine, it is necessary to increase the smoothing time of the flux setpoint (P1582).
- The load-dependent magnetization (P1580 > 0) in the partial load range restricts the dynamic performance of the drive.
- Under no-load conditions, a value of 100 % represents the full flux reduction (i.e. 50 % of the rated motor flux, refer to the diagram).



- P1580 can be activated at the same time with P1570. This allows an optimum adaptation both under no-load conditions/in the partial load range using P1580 as well as in the full load range using P1570.



P1582[3]	**Smooth time for flux setpoint**			**Min:** 4	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 15	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 500	

Sets time constant of PT1 filter to smooth flux setpoint.

Index:

P1582[0] : 1st. Drive data set (DDS)
P1582[1] : 2nd. Drive data set (DDS)
P1582[2] : 3rd. Drive data set (DDS)

r1583	**CO: Flux setpoint (smoothed)**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays smoothed flux setpoint in [%] relative to rated motor flux.

P1596[3]	**Int. time field weak. controller**			**Min:** 20	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 50	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 32001	

Sets integral time for field weakening controller.

Index:

P1596[0] : 1st. Drive data set (DDS)
P1596[1] : 2nd. Drive data set (DDS)
P1596[2] : 3rd. Drive data set (DDS)

r1597	**CO: Outp. field weak. controller**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays output signal of field weakening controller in [%] relative to rated motor flux.

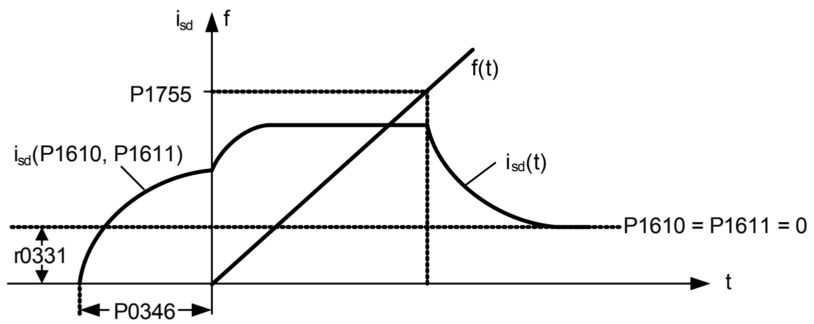
r1598	**CO: Flux setpoint (total)**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays total flux setpoint in [%] relative to the rated motor flux.

P1610[3]	**Continuous torque boost (SLVC)**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 50.0	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.0	

Sets the constant torque boost for the low frequency range when sensorless closed-loop vector control is being used (SLVC). The parameter is entered as a % referred to the rated motor torque (r0333).

For sensorless closed-loop vector control, when the motor model is disabled, an absolute current is impressed. P1610 represents the maximum load that occurs at a constant setpoint.



Index:

P1610[0] : 1st. Drive data set (DDS)
P1610[1] : 2nd. Drive data set (DDS)
P1610[2] : 3rd. Drive data set (DDS)

Caution:

P1610 should always be set at least 10% higher than the maximum steady-state load that occurs.

Note:

- For P1610 = 0 %, a current setpoint is calculated that corresponds to the no-load case (rated magnetization current).
- For P1610 = 100 %, a current setpoint is calculated that corresponds to the rated motor torque.

P1611[3]	**Acc. torque boost (SLVC)**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 0.0	**2**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.0	

Enters the dynamic torque boost for the low frequency range for sensorless closed-loop vector control (SLVC). The parameter is entered as a % referred to the rated motor torque (r0333).

Index:

P1611[0] : 1st. Drive data set (DDS)
P1611[1] : 2nd. Drive data set (DDS)
P1611[2] : 3rd. Drive data set (DDS)

Note:

- When accelerating and braking, P1611 is added to P1610 and the resulting total torque is converted into an appropriate current setpoint and controlled (closed-loop).
- For pure accelerating torques, it is always more favorable to utilize the torque pre-control of the speed controller (P1496).

3.29.2.8 Current controller

P1654[3]	**Smooth time for Isq setpoint**			**Min:** 2.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** ms	**Def:** 6.0	**4**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 20.0	

Sets time constant of PT1 filter to filter setpoint of torque generating current component in field weakening range.

Index:

P1654[0] : 1st. Drive data set (DDS)
P1654[1] : 2nd. Drive data set (DDS)
P1654[2] : 3rd. Drive data set (DDS)

P1715[3]	**Gain current controller**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 0.25	**4**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 5.00	

Enters gain of current controller.

Index:

P1715[0] : 1st. Drive data set (DDS)
P1715[1] : 2nd. Drive data set (DDS)
P1715[2] : 3rd. Drive data set (DDS)

P1717[3]	**Integral time current controller**			**Min:** 1.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** ms	**Def:** 4.1	**4**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 50.0	

Enters integral time of current controller.

Index:

P1717[0] : 1st. Drive data set (DDS)
P1717[1] : 2nd. Drive data set (DDS)
P1717[2] : 3rd. Drive data set (DDS)

r1718	**CO: Output of Isq controller**			**Min:** -	Level
		Datatype: Float	**Unit:** V	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays actual output of Isq current (torque current) controller (PI controller). It contains the proportional and integral part of the PI controller.

r1719	**CO: Integral output of Isq ctrl.**			**Min:** -	Level
		Datatype: Float	**Unit:** V	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays integral output of Isq current (torque current) controller (PI controller).

r1723	**CO: Output of Isd controller**			**Min:** -	Level
		Datatype: Float	**Unit:** V	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays actual output of Isd current (flux current) controller (PI controller). It contains the proportional and integral part of the PI controller.

r1724	**CO: Integral output of Isd ctrl.**			**Min:** -	Level
		Datatype: Float	**Unit:** V	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays integral output of Isd current (flux current) controller (PI controller).

r1725	CO: Integral limit of Isd ctrl.			Min: -	Level 4
		Datatype: Float	Unit: V	Def: -	
	P-Group: CONTROL			Max: -	

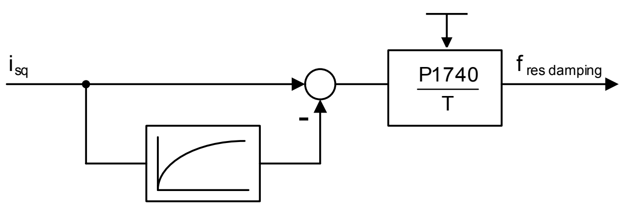
Displays limit of integral output voltage setpoint of Isd current controller.

r1728	CO: Decoupling voltage			Min: -	Level 4
		Datatype: Float	Unit: V	Def: -	
	P-Group: CONTROL			Max: -	

Displays actual output voltage setpoint of cross channel decoupling.

P1740	Gain for oscillation damping			Min: 0.000	Level 3
	CStat: CUT	Datatype: Float	Unit: -	Def: 0.000	
	P-Group: CONTROL	Active: Immediately	QuickComm.: No	Max: 10.000	

Sets the controller gain to dampen oscillations in the sensorless vector control (SLVC) at low frequencies (open-loop).



Dependency:

Siehe P1750, P1755, P1756

P1745[3]	Variance flux error			Min: 0.0	Level 3
	CStat: CUT	Datatype: Float	Unit: %	Def: 5.0	
	P-Group: CONTROL	Active: Immediately	QuickComm.: No	Max: 1000.0	

Allowed variance error between flux setpoint and measured flux.

Index:

P1745[0] : 1st. Drive data set (DDS)
P1745[1] : 2nd. Drive data set (DDS)
P1745[2] : 3rd. Drive data set (DDS)

r1746	CO: Variance flux error			Min: -	Level 3
		Datatype: Float	Unit: %	Def: -	
	P-Group: CONTROL			Max: -	

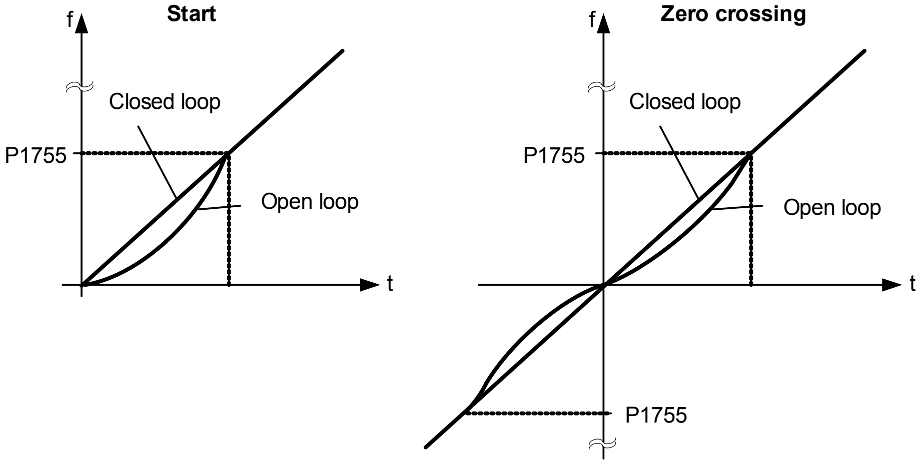
Variance error between flux setpoint and measured flux.

3.29.2.9 Motor model

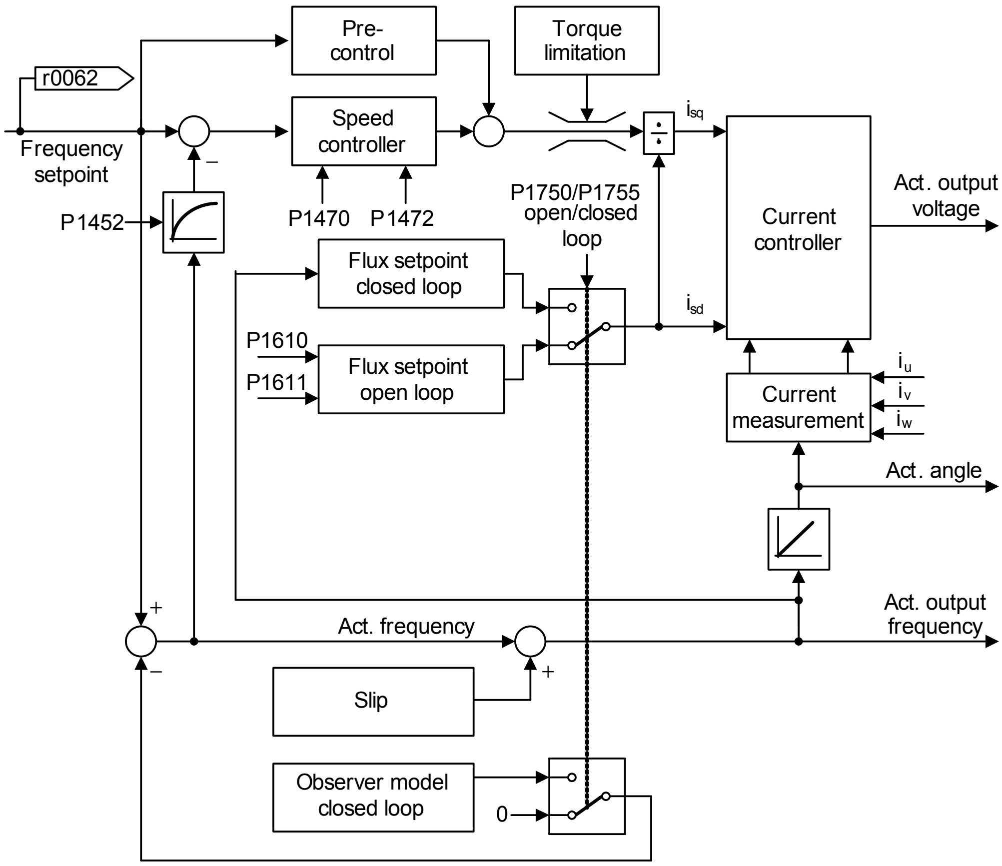
P1750[3]	Control word of motor model			Min: 0	Level 3
	CStat: CUT	Datatype: U16	Unit: -	Def: 0	
	P-Group: CONTROL	Active: first confirm	QuickComm.: No	Max: 3	

Control word of motor model. This parameter controls the operation of the sensorless vector control (SLVC) at very low frequencies. This therefore includes the following conditions:

- Operation directly after an ON command
- zero crossing.



SLVC open loop means that the speed controller does not get any frequency feedback from the observer model.



Bitfields:

Bit00	Start SLVC open loop	0 NO	1 YES
Bit01	Zero crossing SLVC open loop	0 NO	1 YES

Index:

P1750[0] : 1st. Drive data set (DDS)
P1750[1] : 2nd. Drive data set (DDS)
P1750[2] : 3rd. Drive data set (DDS)

---

r1751 **Status word of motor model**

Min: - **Def:** - **Max:** -

Datatype: U16 **Unit:** -

P-Group: CONTROL

Level **3**

Displays status of transition from feed-forward to observer-control and vice versa.

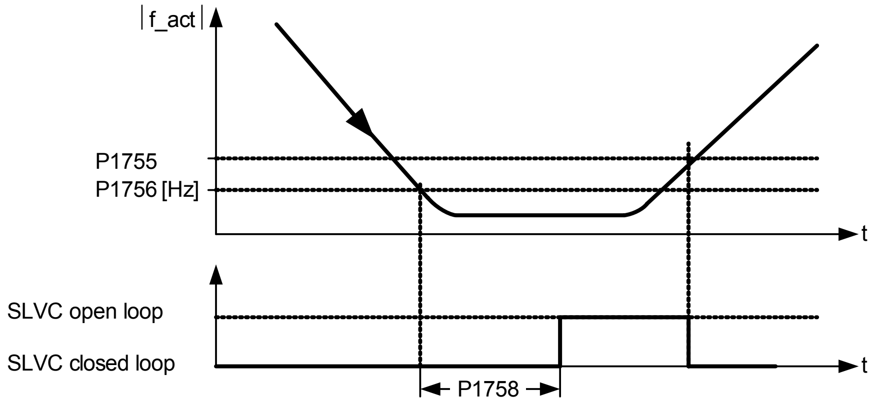
Bitfields:

Bit00	Transit to SLVC open loop	0 NO	1 YES
Bit01	N-adaption enabled	0 NO	1 YES
Bit02	Transit to SLVC closed loop	0 NO	1 YES
Bit03	Speed controller enabled	0 NO	1 YES
Bit04	Current injection	0 NO	1 YES
Bit05	Start flux decrease	0 NO	1 YES
Bit14	Rs adapted	0 NO	1 YES
Bit15	Xh adapted	0 NO	1 YES

P1755[3] Start-freq. motor model (SLVC)

CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Min:** 0.1
P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:** 5.0
			Max: 250.0
Level 3			

Enter the start frequency of sensorless vector control (SLVC), thereby SLVC switches over from open-loop to closed-loop at that frequency.
The default setting depends on the motor power:
- 0 kW to 0.749 kW: 5.0 Hz
- 0.75 kW to 75 kW: 1.5 Hz
- 75.1 kW to 200 kW: 1.0 Hz



$$P1756[Hz] = P1755[Hz] \cdot \frac{P1756[\%]}{100[\%]}$$

Index:
P1755[0] : 1st. Drive data set (DDS)
P1755[1] : 2nd. Drive data set (DDS)
P1755[2] : 3rd. Drive data set (DDS)

P1756[3] Hyst.-freq. motor model (SLVC)

CStat: CUT	**Datatype:** Float	**Unit:** %	**Min:** 10.0
P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:** 50.0
			Max: 100.0
Level 3			

Enters hysteresis frequency (in percent of start-frequency) to switch back from sensorless-vector-control (SLVC) to current model.

Value is entered in the range 0 % to 50 % relative to P1755 (SLVC stop frequency).

Index:
P1756[0] : 1st. Drive data set (DDS)
P1756[1] : 2nd. Drive data set (DDS)
P1756[2] : 3rd. Drive data set (DDS)

P1758[3] Chng-ov. del. t SLVC op.-lp ctrl

CStat: CUT	**Datatype:** U16	**Unit:** ms	**Min:** 100
P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:** 1500
			Max: 2000
Level 3			

Sets the minimum time when the changeover frequency is fallen below when changing from the closed-loop into the open-loop controlled mode.

Index:
P1758[0] : 1st. Drive data set (DDS)
P1758[1] : 2nd. Drive data set (DDS)
P1758[2] : 3rd. Drive data set (DDS)

Dependency:
Refer to P1750, P1755, P1756

P1759[3] Chng-ov. del. t SLVC cl.-lp ctrl

CStat: CUT	**Datatype:** U16	**Unit:** ms	**Min:** 50
P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Def:** 100
			Max: 2000
Level 3			

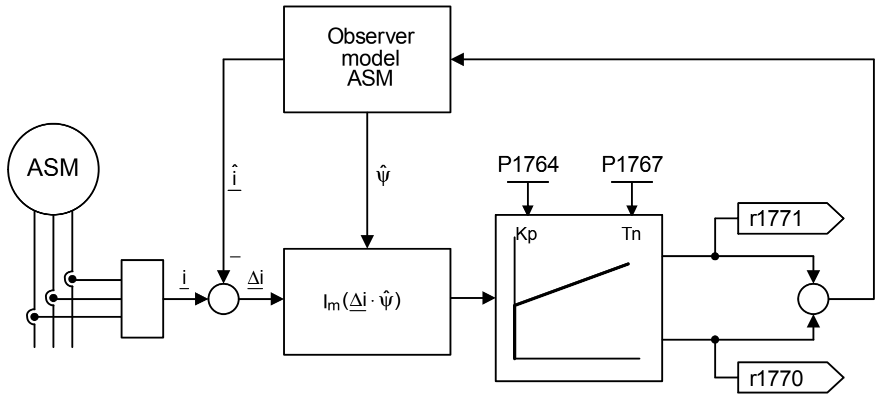
Sets the minimum time when the changeover frequency is exceeded when changing from the open-loop controlled into the closed-loop controlled mode.

Index:
P1759[0] : 1st. Drive data set (DDS)
P1759[1] : 2nd. Drive data set (DDS)
P1759[2] : 3rd. Drive data set (DDS)

Dependency:
Refer to P1750, P1755, P1756

P1764[3]	**Kp of n-adaption (SLVC)**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 0.2	**3**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 2.5	

Enters gain of speed adaptation controller for sensorless vector control.



Index:

P1764[0] : 1st. Drive data set (DDS)
P1764[1] : 2nd. Drive data set (DDS)
P1764[2] : 3rd. Drive data set (DDS)

P1767[3]	**Tn of n-adaption (SLVC)**			**Min:** 1.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** ms	**Def:** 4.0	**4**
	P-Group: CONTROL	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.0	

Enters speed adaptation controller integral time.

Index:

P1767[0] : 1st. Drive data set (DDS)
P1767[1] : 2nd. Drive data set (DDS)
P1767[2] : 3rd. Drive data set (DDS)

r1770	**CO: Prop. output of n-adaption**			**Min:** -	Level
		Datatype: Float	**Unit:** Hz	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays proportional part of speed adaptation controller.

r1771	**CO: Int. output of n-adaption**			**Min:** -	Level
		Datatype: Float	**Unit:** Hz	**Def:** -	**3**
	P-Group: CONTROL			**Max:** -	

Displays integral part of speed adaptation controller.

r1778	**CO: Flux angle difference**			**Min:** -	Level
		Datatype: Float	**Unit:** °	**Def:** -	**4**
	P-Group: CONTROL			**Max:** -	

Displays flux angle difference between motor model and current transformation before motor model is active.

P1780[3]	**Control word of Rs/Rr-adaption**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 3	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:** 3	

Enables thermal adaptation of stator and rotor resistance to reduce torque errors in speed/torque regulation with speed sensor, or frequency errors in speed/torque regulation without speed sensor.

Bitfields:

Bit00	Enable thermal Rs/Rr-adapt.	0 NO	1 YES
Bit01	Enable observer Rs/Xm-adapt.	0 NO	1 YES

Index:

P1780[0] : 1st. Drive data set (DDS)
P1780[1] : 2nd. Drive data set (DDS)
P1780[2] : 3rd. Drive data set (DDS)

Note:

Only stator resistance adaptation is carried out for synchronous motors.

P1781[3]	Tn of Rs-adaption			Min: 10	Level 4
	CStat: CUT	Datatype: U16	Unit: ms	Def: 100	
	P-Group: CONTROL	Active: Immediately	QuickComm.: No	Max: 2000	

Enters Rs-adaptation controller integral time.

Index:

P1781[0] : 1st. Drive data set (DDS)
P1781[1] : 2nd. Drive data set (DDS)
P1781[2] : 3rd. Drive data set (DDS)

r1782	Output of Rs-adaptation			Min: -	Level 3
		Datatype: Float	Unit: %	Def: -	
	P-Group: CONTROL			Max: -	

Displays stator resistance adaptation from controller in [%] relative to rated motor resistance.

Stator resistance is obtained as a function of the motor temperature as:

a) $\vartheta_{act} \approx P0625$:

$$R_{sact} = R_{sStart} + R_{sadapt} = Z_N \cdot \frac{r0370 - r1782}{100\%} \quad \text{with} \quad R_{sStart} = R_s(P0625)$$

b) $\vartheta_{act} = r0633$:

$$R_{sact} = R_s(r0633) + R_{sadapt} = Z_N \cdot \frac{r0395 - r1782}{100\%}$$

Note:

Rated motor impedance:

$$Z_N = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \quad \text{<=>} 100\%$$

P1786[3]	Tn of Xm-adaption			Min: 10	Level 4
	CStat: CUT	Datatype: U16	Unit: ms	Def: 100	
	P-Group: CONTROL	Active: Immediately	QuickComm.: No	Max: 2000	

Enters Xm-adaptation controller integral time.

Index:

P1786[0] : 1st. Drive data set (DDS)
P1786[1] : 2nd. Drive data set (DDS)
P1786[2] : 3rd. Drive data set (DDS)

r1787	Output of Xm-adaption			Min: -	Level 3
		Datatype: Float	Unit: %	Def: -	
	P-Group: CONTROL			Max: -	

Displays main reactance adaptation from controller in [%] relative to rated impedance.

For $f \leq f_N$ is valid

$$X_{m\Gamma act} = X_{m\Gamma Start} + X_{m\Gamma adapt} = Z_N \cdot \frac{r0382 - r1787}{100\%}$$

Note:

Rated motor impedance:

$$Z_N = \frac{V_N}{\sqrt{3} \cdot I_N} = \frac{P0304}{\sqrt{3} \cdot P0305} \quad \text{<=>} 100\%$$

3.30 Inverter parameters (Modulator)

P1800 **Pulse frequency**

CStat: CUT	**Datatype:** U16	**Unit:** kHz	**Min:** 2		Level
P-Group: INVERTER	**Active:** Immediately	**QuickComm.:** No	**Def:** 4	**Max:** 16	**2**

Sets pulse frequency of power switches in inverter. The frequency can be changed in steps of 2 kHz.

Dependency:

Minimum pulse frequency depends on P1082 (maximum frequency) and P0310 (rated motor frequency).
- see derating in P1082
- P1800 > 30 * P0310

Note:

- If the pulse frequency is increased, max. inverter current r0209 can be reduced (derating). The derating characteristic depends on the type and power of the inverter (see manuall OPERATING INSTRUCTION).
- If silent operation is not absolutely necessary, lower pulse frequencies may be selected to reduce inverter losses and radio-frequency emissions.
- Under certain circumstances, the inverter may reduce the switching frequency to provide protection against over-temperature (see P0290).

r1801 **CO: Act. pulse frequency**

	Datatype: U16	**Unit:** kHz	**Min:** - **Def:** -	Level
P-Group: INVERTER			**Max:** -	**3**

Actual pulse frequency of power switches in inverter.

Notice:

Under certain conditions (inverter overtemperature, see P0290), this can differ from the values selected in P1800 (pulse frequency).

P1802 **Modulator mode**

CStat: CUT	**Datatype:** U16	**Unit:** -	**Min:** 0 **Def:** 0	Level
P-Group: INVERTER	**Active:** first confirm	**QuickComm.:** No	**Max:** 2	**3**

Selects inverter modulator mode.

Possible Settings:

0 SVM/ASVM automatic mode
1 Asymmetric SVM
2 Space vector modulation

Notice:

- Asymmetric space vector modulation (ASVM) produces lower switching losses than space vector modulation (SVM), but may cause irregular rotation at very low frequencies.
- Space vector modulation (SVM) with over-modulation may produce current waveform distortion at high output voltages.
- Space vector modulation (SVM) without over-modulation will reduce maximum output voltage available to motor.

P1803[3] **Max. modulation**

CStat: CUT	**Datatype:** Float	**Unit:** %	**Min:** 20.0 **Def:** 106.0	Level
P-Group: INVERTER	**Active:** Immediately	**QuickComm.:** No	**Max:** 150.0	**4**

Sets maximum modulation index.

Index:

P1803[0] : 1st. Drive data set (DDS)
P1803[1] : 2nd. Drive data set (DDS)
P1803[2] : 3rd. Drive data set (DDS)

Note:

- P1803 = 100 % : Limit for over-control (for ideal inverter without switching delay).

- For vector control the modulation limit will be reduced automatically with 4 %.

P1820[3] **Reverse output phase sequence**

CStat: CT	**Datatype:** U16	**Unit:** -	**Min:** 0 **Def:** 0	Level
P-Group: INVERTER	**Active:** first confirm	**QuickComm.:** No	**Max:** 1	**2**

Changes direction of motor rotation without changing setpoint polarity.

Possible Settings:

0 OFF
1 ON

Index:

P1820[0] : 1st. Drive data set (DDS)
P1820[1] : 2nd. Drive data set (DDS)
P1820[2] : 3rd. Drive data set (DDS)

Dependency:

If positive and negative revolution is enabled, frequency setpoint is directly used.
If both positive and negative revolution are disabled, reference value is set to zero.

Details:

See P1000 (select frequency setpoint)

P1825	**On-state voltage of IGBT**			**Min:**	0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** V	**Def:**	1.4	**4**
	P-Group: INVERTER	**Active:** Immediately	**QuickComm.:** No	**Max:**	20.0	

Corrects on-state voltage of the IGBTs.

P1828	**Gating unit dead time**			**Min:**	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** us	**Def:**	0.50	**4**
	P-Group: INVERTER	**Active:** first confirm	**QuickComm.:** No	**Max:**	3.50	

Sets compensation time of gating unit interlock.

3.31 Motor data identification

P1909[3]	**Ctrl. word of motor data ident.**			**Min:**	0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:**	1	**4**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:**	1	

Control word of motor data identification.

Bitfields:

```
Bit00   Estimation of Xs                          0  NO         1  YES
```

Index:

P1909[0] : 1st. Drive data set (DDS)
P1909[1] : 2nd. Drive data set (DDS)
P1909[2] : 3rd. Drive data set (DDS)

P1910	**Select motor data identification**			**Min:**	0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:**	0	**2**
	P-Group: MOTOR	**Active:** first confirm	**QuickComm.:** Yes	**Max:**	20	

Performs a motor data identification.

Possible Settings:

0 Disabled
1 Identification of all parameters with parameter change
2 Identification of all parameters without parameter change
3 Identification of saturation curve with parameter change
4 Identification of saturation curve without parameter change
5 Identification of XsigDyn (r1920) without parameter change
6 Identification of Tdead (r1926) without parameter change
7 Identification of Rs (r1912) without parameter change
8 Identification of Xs (r1915) without parameter change
9 Identification of Tr (r1913) without parameter change
10 Identification of Xsigma (r1914) without parameter change
20 Set voltage vector

Common Settings:

P1910 = 1:

All motor data and inverter characteristic will be identified and parameter will be changed.

- P0350 stator resistance,
- P0354 rotor resistance,
- P0356 stator leakage inductance,
- P0358 rotor leakage inductance,
- P0360 main inductance
- P1825 on-state voltage of IGBTs
- P1828 compensation time of gating unit interlock

P1910 = 3:

Saturation curve will be identified and parameter will be changed.

- P0362 ... P0365 magnetizing curve flux 1 .. 4
- P0366 ... P0369 magnetizing curve imag 1 .. 4

Caution:

Motor identification should normally be performed on a cold motor. However, the identification of the motor data should only be performed if the motor temperature is within 5°C of the measured ambient temperature stored in P0625. If the motor identification is not within the 5ºC limit then the correct functioning of Vector Control (VC, SLVC) cannot be guaranteed. This may cause instabilities when using vector control.

The motor rating plate information with respect to the connection of the motor windings (Star or delta connection) must be correct in order to establish the correct equivalent circuit data. The motor identification calculates this data based on a Phase of a Star equivalent circuit P0350 - P0360, irrespective of whether the motor is connected star or delta. This must be considered when the motor data is input directly.

Note:

- In order to that the motor identification routine supplies the correct data, before selecting, fast commissioning should be carried-out.
- If the motor data identification routine is activated (e.g. P1910 = 1), then at the next ON command, the measuring operation is started and alarm A0541 is generated. After the measurement is completed, both P1910 and the alarm are reset.

Notice:

When choosing the setting for measurement, observe the following:

1. "with parameter change"
   means that the values are actually adopted as Pxxxx parameter settings (see common settings above) and applied to the controller as well as being shown in the read-only parameters below.

2. "without parameter change"
   means that the values are only displayed, i.e. shown for checking purposes in the read-only parameters r1912 (identified stator resistance), r1913 (identified rotor time constant), r1914 (ident. total leakage reactance), r1915/r1916/r1917/r1918/r1919 (identified nominal stator reactance/identified stator reactance 1 to 4), r1925 (IGBT on-state voltage) and r1926 (identified gating unit dead time). The values are not applied to the controller.

P1911 No. of phase to be identified

CStat: CT	**Datatype:** U16	**Unit:** -	**Min:** 1	Level
P-Group: INVERTER	**Active:** Immediately	**QuickComm.:** No	**Def:** 3	**2**
			Max: 3	

Selects maximum number of motor phases to be identified.

r1912[3] Identified stator resistance

	Datatype: Float	**Unit:** Ohm	**Min:** -	Level
P-Group: MOTOR			**Def:** -	**2**
			Max: -	

Displays measured stator resistance value (line-to-line) in [Ohms]

Index:

r1912[0] : U_phase
r1912[1] : V_phase
r1912[2] : W_phase

Note:

This value is measured using P1910 = 1 or 2 , i.e., identification of all parameters with/without change.

r1913[3] Identified rotor time constant

	Datatype: Float	**Unit:** ms	**Min:** -	Level
P-Group: MOTOR			**Def:** -	**2**
			Max: -	

Displays identified rotor time constant.

Index:

r1913[0] : U_phase
r1913[1] : V_phase
r1913[2] : W_phase

r1914[3] Ident. total leakage inductance

	Datatype: Float	**Unit:** -	**Min:** -	Level
P-Group: MOTOR			**Def:** -	**2**
			Max: -	

Displays identified total leakage inductance.

Index:

r1914[0] : U_phase
r1914[1] : V_phase
r1914[2] : W_phase

r1915[3] Ident. nom. stator inductance

	Datatype: Float	**Unit:** -	**Min:** -	Level
P-Group: MOTOR			**Def:** -	**2**
			Max: -	

Displays identified stator inductance.

Index:

r1915[0] : U_phase
r1915[1] : V_phase
r1915[2] : W_phase

Notice:

If the value identified (Ls = stator inductance) does not lie within the range 50 % < Xs [p. u.] < 500 % fault message 41 (motor data identification failure) is issued.

r0949 provides further information (fault value = 4 in this case).

r1916[3] Identified stator inductance 1

	Datatype: Float	**Unit:** -	**Min:** -	Level
P-Group: MOTOR			**Def:** -	**2**
			Max: -	

Displays identified stator inductance.

Index:

r1916[0] : U_phase
r1916[1] : V_phase
r1916[2] : W_phase

Details:

See P1915 (identified nominal stator inductance).

r1917[3] Identified stator inductance 2

	Datatype: Float	**Unit:** -	**Min:** -	Level
P-Group: MOTOR			**Def:** -	**2**
			Max: -	

Displays identified stator inductance.

Index:

r1917[0] : U_phase
r1917[1] : V_phase
r1917[2] : W_phase

Details:

See P1915 (identified nominal stator inductance)

r1918[3] Identified stator inductance 3

	Datatype: Float	**Unit:** -	**Min:** -	Level
P-Group: MOTOR			**Def:** -	**2**
			Max: -	

Displays identified stator inductance.

Index:

r1918[0] : U_phase
r1918[1] : V_phase
r1918[2] : W_phase

Details:

See P1915 (identified nominal stator reactance)

r1919[3] Identified stator inductance 4

	Datatype: Float	**Unit:** -	**Min:** -	Level
P-Group: MOTOR			**Def:** -	**2**
			Max: -	

Displays identified stator inductance.

Index:

r1919[0] : U_phase
r1919[1] : V_phase
r1919[2] : W_phase

Details:

See P1915 (identified nominal stator inductance)

r1920[3] Identified dyn. leak. inductance

	Datatype: Float	**Unit:** -	**Min:** -	Level
P-Group: MOTOR			**Def:** -	**2**
			Max: -	

Displays identified total dynamic leakage inductance.

Index:

r1920[0] : U_phase
r1920[1] : V_phase
r1920[2] : W_phase

r1925 Identified on-state voltage

	Datatype: Float	**Unit:** V	**Min:** -	Level
P-Group: INVERTER			**Def:** -	**2**
			Max: -	

Displays identified on-state voltage of IGBT.

r1926 Ident. gating unit dead time

	Datatype: Float	**Unit:** us	**Min:** -	Level
P-Group: INVERTER			**Def:** -	**2**
			Max: -	

Displays identified dead time of gating unit interlock.

P1930 Voltage setpoint for calibration

CStat: CUT	**Datatype:** Float	**Unit:** V	**Min:** 0	Level
P-Group: INVERTER	**Active:** Immediately	**QuickComm.:** No	**Def:** 0	**4**
			Max: 1000	

Specifies reference voltage for generation of a test voltage vector (e.g. used for shunt calibration).

P1931 Phase

CStat: CUT	**Datatype:** U16	**Unit:** -	**Min:** 1	Level
P-Group: INVERTER	**Active:** Immediately	**QuickComm.:** No	**Def:** 1	**4**
			Max: 6	

Defines phase of voltage vector

3.32 Speed optimization

P1960 — **Speed control optimisation**

CStat: CT	**Datatype:** U16	**Unit:** -	**Min:** 0	**Def:** 0	**Max:** 1	Level **3**
P-Group: MOTOR	**Active:** first confirm	**QuickComm.:** No				

The drive should be set into a vector mode (P1300 = 20 or 21) to carry out speed controller optimisation. When speed controller optimisation is enabled (P1960 = 1) the warning A0542 will become active.

When the drive is next started it will do the optimisation tests. The drive will accelerate the motor to 20 % of P0310 (rated motor frequency) using the ramp up time P1120 and then under torque control go to 50 % of P0310 (rated motor frequency). The drive will then ramp back down to 20 % using the ramp down time P1121. This procedure is repeated several times and then average time taken. From this an estimation of the inertia of the load on the motor can be derived. From this the inertia ratio parameter (P0342) and the Kp gains for VC (P1460) and SLVC (P1470) are modified to give a response suitable for the measured inertia.

Possible Settings:

0 Disabled
1 Enabled

Note:

- When the test is complete P1960 will be cleared to zero.
- If there is a problem due to instability the drive may trip with an F0042 fault if a stable value has not been obtained on the ramp up within a reasonable time.
- It should be noted that the DC-link controller should be enabled whilst doing the test as otherwise overvoltage trips maybe experienced. This will however depend on the ramp down time and the system inertia.
- The speed loop optimisation may not be suitable for some applications due to the nature of the test i.e. accelerating under torque control from 20 % to 50 %.

3.33 Reference parameters

P2000[3] — **Reference frequency**

CStat: CT	**Datatype:** Float	**Unit:** Hz	**Min:** 1.00	**Def:** 50.00	**Max:** 650.00	Level **2**
P-Group: COMM	**Active:** first confirm	**QuickComm.:** No				

Parameter P2000 represents the reference frequency for frequency values which are displayed/transferred as a percentage or a hexadecimal value. Where:

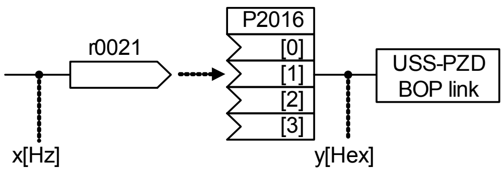
- hexadecimal 4000 H ==> P2000 (e.g.: USS-PZD)
- percentage 100 % ==> P2000 (e.g.: ADC)

Index:

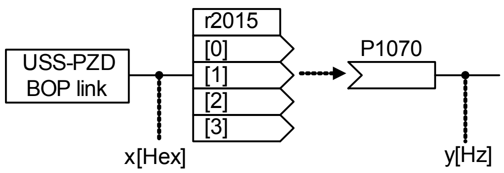
P2000[0] : 1st. Drive data set (DDS)
P2000[1] : 2nd. Drive data set (DDS)
P2000[2] : 3rd. Drive data set (DDS)

Example:

If a BICO connection is made between two parameters or alternatively using P0719 or P1000, the "unit" of the parameters (standardized (Hex) or physical (i.e. Hz) values) may differ. MICROMASTER implicitly makes an automatic conversion to the target value.



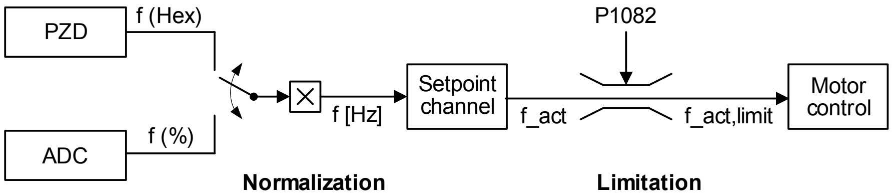
$$y[Hex] = \frac{r0021[Hz]}{P2000[Hz]} \cdot 4000[Hex]$$



$$y[Hz] = \frac{r2015[1]}{4000[Hex]} \cdot P2000$$

Caution:

Parameter P2000 represents the reference frequency of the above mentioned interfaces. A maximum frequency setpoint of 2*P2000 can be applied via the corresponding interface. Unlike parameter P1082 (Max. Frequency) this limits the inverter frequency internally independent of the reference frequency. By modification of P2000 it will also adapt the parameter to the new settings.



$$f[Hz] = \frac{f(Hex)}{4000(Hex)} \cdot P2000 = \frac{f(\%)}{100\,\%} \cdot P2000$$

f_act,limit = min(P1082, f_act)

Notice:

Reference variables are intended as an aid to presenting setpoint and actual value signals in a uniform manner. This also applies to fixed settings entered as a precentage. A value of 100 % (USS / CB) corresponds to a process data value of 4000H, or 4000 0000H in the case of double values.

In this respect, the following parameters are available:

P2000	Reference frequency	Hz	
P2001	Reference voltage	V	
P2002	Reference current	A	
P2003	Reference torque	Nm	
P2004	Reference power	kW hp	f(P0100)

P2001[3]	**Reference voltage**			**Min:** 10	Level
	CStat: CT	**Datatype:** U16	**Unit:** V	**Def:** 1000	**3**
	P-Group: COMM	**Active:** first confirm	**QuickComm.:** No	**Max:** 2000	

Full-scale output voltage (i.e. 100 %) used over serial link (corresponds to 4000H).

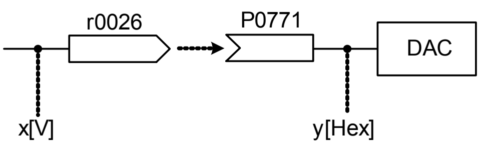
Index:

P2001[0] : 1st. Drive data set (DDS)
P2001[1] : 2nd. Drive data set (DDS)
P2001[2] : 3rd. Drive data set (DDS)

Example:

P2001 = 230 specifies that 4000H received via USS denotes 230 V.

If a BICO connection is made between two parameters, the "unit" of the parameters (standardized (Hex) or physical (i.e. V) values) may differ. MICROMASTER implicitly makes an automatic conversion to the target value.



$$y[Hex] = \frac{r0026[V]}{P2001[V]} \cdot 4000[Hex]$$

P2002[3] Reference current

CStat: CT	**Datatype:** Float	**Unit:** A	**Min:**	0.10	Level
P-Group: COMM	**Active:** first confirm	**QuickComm.:** No	**Def:**	0.10	**3**
			Max:	10000.00	

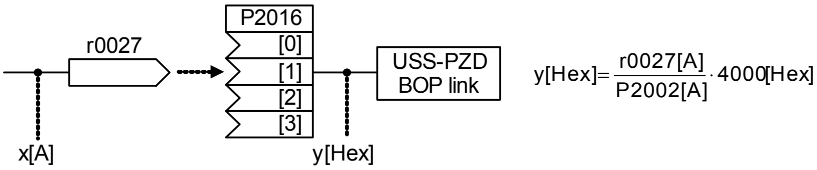
Full-scale output current used over serial link (corresponds to 4000H).

Index:

P2002[0] : 1st. Drive data set (DDS)
P2002[1] : 2nd. Drive data set (DDS)
P2002[2] : 3rd. Drive data set (DDS)

Example:

If a BICO connection is made between two parameters, the "unit" of the parameters (standardized (Hex) or physical (i.e. A) values) may differ. MICROMASTER implicitly makes an automatic conversion to the target value.



P2003[3] Reference torque

CStat: CT	**Datatype:** Float	**Unit:** Nm	**Min:**	0.10	Level
P-Group: COMM	**Active:** first confirm	**QuickComm.:** No	**Def:**	0.12	**3**
			Max:	99999.00	

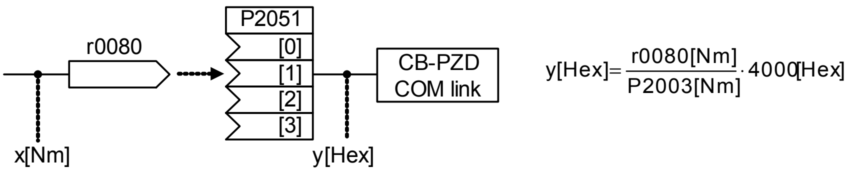
Full-scale reference torque used over the serial link (corresponds to 4000H).

Index:

P2003[0] : 1st. Drive data set (DDS)
P2003[1] : 2nd. Drive data set (DDS)
P2003[2] : 3rd. Drive data set (DDS)

Example:

If a BICO connection is made between two parameters or alternatively using P1500, the "unit" of the parameters (standardized (Hex) or physical (i.e. Nm) values) may differ. MICROMASTER implicitly makes an automatic conversion to the target value.



P2004[3] Reference power

CStat: CT	**Datatype:** Float	**Unit:** -	**Min:**	0	Level
P-Group: COMM	**Active:** first confirm	**QuickComm.:** No	**Def:**		**3**
			Max:	0	

Full-scale reference power used over the serial link (corresponds to 4000H).

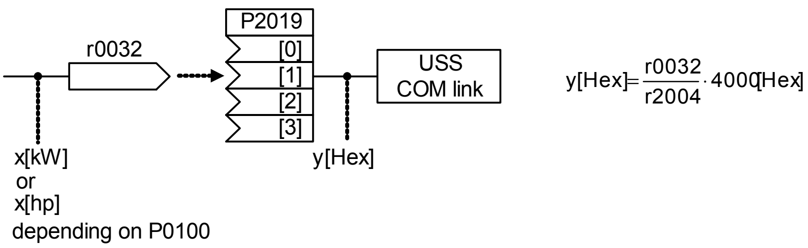
$$r2004 = \frac{1}{2} \cdot 2 \cdot \pi \cdot f \cdot M = \pi \cdot P2000 \cdot P2003$$

Index:

P2004[0] : 1st. Drive data set (DDS)
P2004[1] : 2nd. Drive data set (DDS)
P2004[2] : 3rd. Drive data set (DDS)

Example:

If a BICO connection is made between two parameters, the "unit" of the parameters (standardized (Hex) or physical (i.e. kW / hp) values) may differ. MICROMASTER implicitly makes an automatic conversion to the target value.



3.34 Communication parameters (USS, CB)

P2009[2]	**USS denormalization**			**Min:** 0		Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0		**3**
	P-Group: COMM	**Active:** first confirm	**QuickComm.:** No	**Max:** 1		

Enables denormalization for USS.

Possible Settings:

0 Disabled
1 Enabled

Index:

P2009[0] : Serial interface COM link
P2009[1] : Serial interface BOP link

Note:

If denormalization is enabled, the main setpoint (word 2 in PZD) is not interpreted as 100 % = 4000H, but as "absolute" instead (e.g. 4000H = 16384 means 163.84 Hz) if this is a frequency. Denormalization (P2009 = 1) only works for frequencies and is intended for backwards compatibility with MM3.

P2010[2]	**USS baudrate**			**Min:** 4		Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 6		**2**
	P-Group: COMM	**Active:** first confirm	**QuickComm.:** No	**Max:** 12		

Sets baud rate for USS communication.

Possible Settings:

4 2400 baud
5 4800 baud
6 9600 baud
7 19200 baud
8 38400 baud
9 57600 baud
10 76800 baud
11 93750 baud
12 115200 baud

Index:

P2010[0] : Serial interface COM link
P2010[1] : Serial interface BOP link

P2011[2]	**USS address**			**Min:** 0		Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0		**2**
	P-Group: COMM	**Active:** first confirm	**QuickComm.:** No	**Max:** 31		

Sets unique address for inverter.

Index:

P2011[0] : Serial interface COM link
P2011[1] : Serial interface BOP link

Note:

You can connect up to a further 30 inverters via the serial link (i.e. 31 inverters in total) and control them with the USS serial bus protocol.

P2012[2]	**USS PZD length**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 2	**3**
	P-Group: COMM	**Active:** first confirm	**QuickComm.:** No	**Max:** 8	

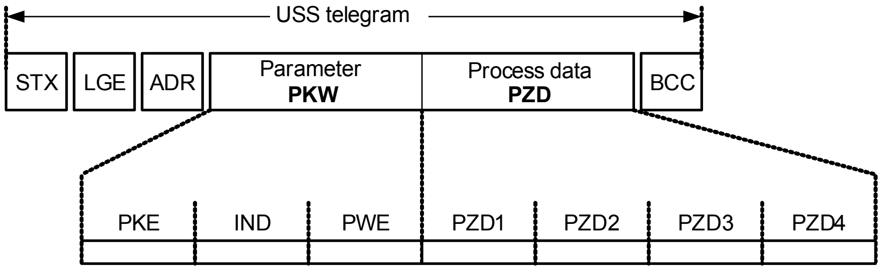
Defines the number of 16-bit words in PZD part of USS telegram.

Index:

P2012[0] : Serial interface COM link
P2012[1] : Serial interface BOP link

Notice:

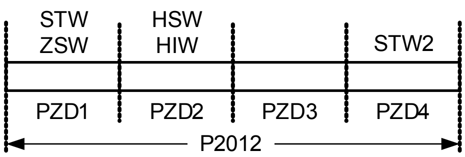
USS protocol consists of PZD and PKW which can be changed by the user via parameters P2012 and P2013 respectively.



STX	Start of text	PKE	Parameter ID
LGE	Length	IND	Sub-index
ADR	Address	PWE	Parameter value
PKW	Parameter ID value		
PZD	Process data		
BCC	Block check character		

PZD transmits a control word and setpoint or status word and actual values. The number of PZD-words in a USS-telegram are determined by parameter P2012, where the first two words (P2012 >= 2) are either:
- control word and main setpoint or
- status word and actual value.

Restrictions:
- If the above serial interface controls the inverter (P0700 or P0719) then the 1st control word must be transferred in the 1st PZD-word.
- If the setpoint source is selected via P1000 or P0719, then the main setpoint must be transfered in the 2nd PZD-word,
- When P2012 is greater than or equal to 4 the additional control word (2nd control word) must transferred in the 4th PZD-word, if the serial interface controls the inverter (P0700 or P0719).



STW	Control word	HSW	Main setpoint
ZSW	Status word	HIW	Main actual value
PZD	Process data		

P2013[2]	USS PKW length			Min: 0	Level
	CStat: CUT	Datatype: U16	Unit: -	Def: 127	3
	P-Group: COMM	Active: first confirm	QuickComm.: No	Max: 127	

Defines the number of 16-bit words in PKW part of USS telegram.

The PKW part consists of the PKE part (1. word), IND part (2. word) resp. PWE part (3. - n. word). In contrary to the IND and PKE part, the PWE part can be varied. Depending on the particular requirement, 3-word, 4-word or variable word lengths can be parameterized. The PKW part of the USS telegram is used to read and write individual parameter values.

Possible Settings:

0 No words
3 3 words
4 4 words
127 Variable

Index:

P2013[0] : Serial interface COM link
P2013[1] : Serial interface BOP link

Example:

	Data type		
	U16 (16 Bit)	U32 (32 Bit)	Float (32 Bit)
P2013 = 3	X	Parameter access fault	Parameter access fault
P2013 = 4	X	X	X
P2013 = 127	X	X	X

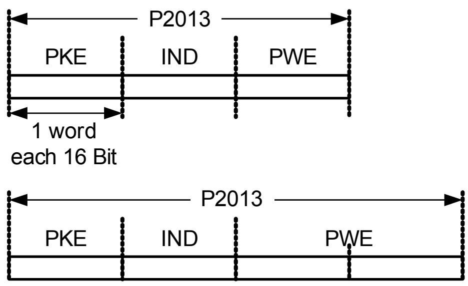
Notice:

USS protocol consists of PZD and PKW which can be changed by the user via parameters P2012 and P2013 respectively. Parameter P2013 determines the number of PKW-words in a USS-telegram.

Setting P2013 to 3 or 4 determines the length of the PKW (3 = three words and 4 = four words). When P2013 set to 127 automatically adjusts the length of the PKW words are required.

P2013 = 3

P2013 = 4



PKE Parameter ID
IND Sub-index
PWE Parameter value

If a fixed PKW length is selected only one parameter value can be transferred. In the case of indexed parameter, you must use the variable PKW length if you wish to have the values of all indices transferred in a single telegram. In selecting the fixed PKW length, it is important to ensure the value in question can be transferred using this PKW length.

P2013 = 3, fixes PKW length, but does not allow access to many parameter values. A parameter fault is generated when an out-of-range value is used, the value will not be accepted but the inverter state will not be affected. Useful for applications where parameters are not changed, but MM3s are also used. Broadcast mode is not possible with this setting.

P2013 = 4, fixes PKW length. Allows access to all parameters, but indexed parameters can only be read one index at a time. Word order for single word values are different to setting 3 or 127, see example below.

P2013 = 127, most useful setting. PKW reply length varies depending on the amount of information needed. Can read fault information and all indices of a parameter with a single telegram with this setting.

Example:
Set P0700 to value 5 (0700 = 2BC (hex))

	P2013 = 3	P2013 = 4	P2013 = 127
Master → MM4	22BC 0000 0005	22BC 0000 0000 0005	22BC 0000 0005 0000
MM4 → Master	12BC 0000 0005	12BC 0000 0000 0005	12BC 0000 0005

P2014[2]	**USS telegram off time**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** ms	**Def:** 0	**3**
	P-Group: COMM	**Active:** Immediately	**QuickComm.:** No	**Max:** 65535	

Defines the telegram failure time for the serial interfaces with USS protocol.

The telegram failure time defines the time within which a valid telegram must have been received. If a valid telegram is not received within the specified time, the drive inverter outputs fault F0070.

Index:

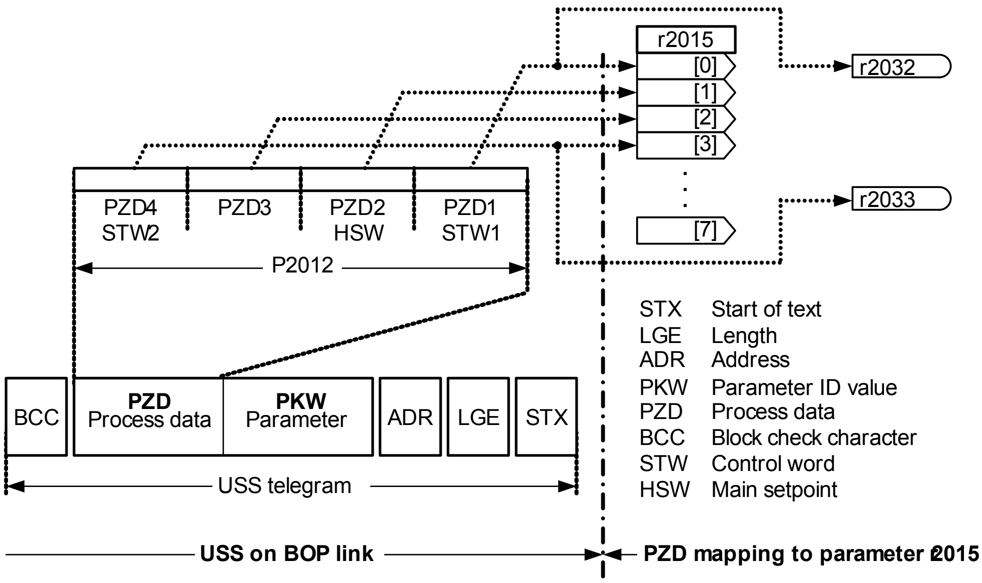
P2014[0] : Serial interface COM link
P2014[1] : Serial interface BOP link

Notice:

By default (time set to 0), no fault is generated (i.e. watchdog disabled).

r2015[8]	**CO: PZD from BOP link (USS)**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: COMM			**Max:** -	

Displays process data received via USS on BOP link (RS232 USS).



Index:

r2015[0] : Received word 0
r2015[1] : Received word 1
r2015[2] : Received word 2
r2015[3] : Received word 3
r2015[4] : Received word 4
r2015[5] : Received word 5
r2015[6] : Received word 6
r2015[7] : Received word 7

Note:

The control words can be viewed as bit parameters r2032 and r2033.

Restrictions:

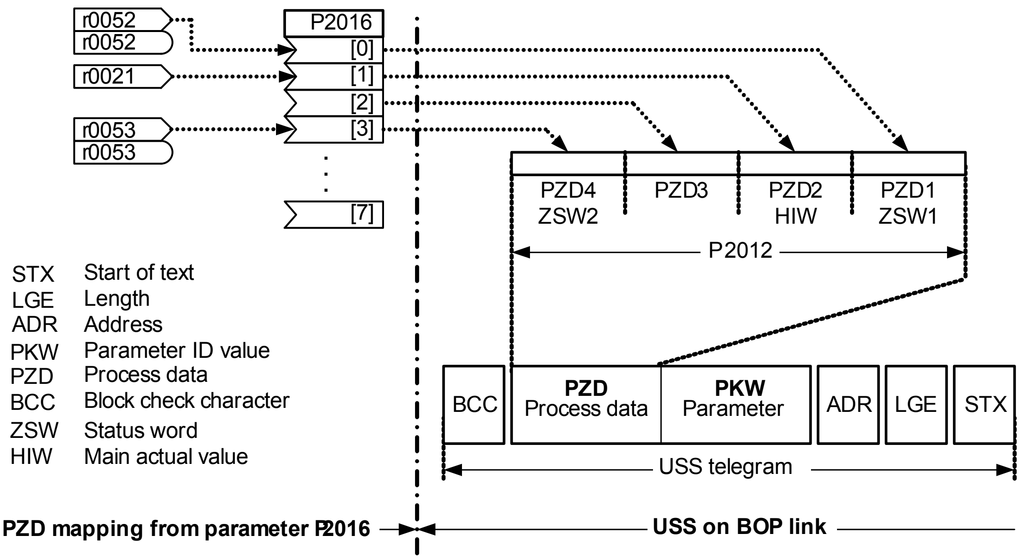
- If the above serial interface controls the inverter (P0700 or P0719) then the 1st control word must be transferred in the 1st PZD-word.
- If the setpoint source is selected via P1000 or P0719, then the main setpoint must be transfered in the 2nd PZD-word,
- When P2012 is greater than or equal to 4 the additional control word (2nd control word) must transferred in the 4th PZD-word, if the above serial interface controls the inverter (P0700 or P0719).

P2016[8] **CI: PZD to BOP link (USS)**

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0
P-Group:	COMM	**Active:** Immediately	**QuickComm.:** No	**Def:**	52:0
				Max:	4000:0

Level **3**

Selects signals (process data PZD) to be transmitted to serial interface via USS on BOP link



Index:

P2016[0] : Transmitted word 0
P2016[1] : Transmitted word 1
P2016[2] : Transmitted word 2
P2016[3] : Transmitted word 3
P2016[4] : Transmitted word 4
P2016[5] : Transmitted word 5
P2016[6] : Transmitted word 6
P2016[7] : Transmitted word 7

Example:

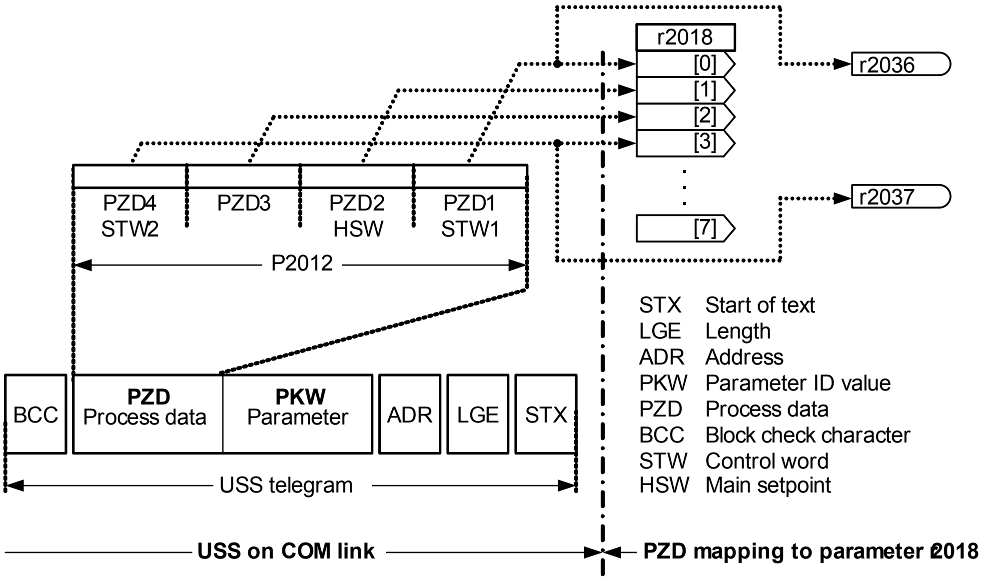
P2016[0] = 52.0 (default). In this case, the value of r0052[0] (CO/BO: Status word) is transmitted as 1st PZD to the BOP link.

Note:

If r0052 not indexed, display does not show an index (".0").

r2018[8]	CO: PZD from COM link (USS)		Min: -	Level
	Datatype: U16	Unit: -	Def: -	3
P-Group: COMM			Max: -	

Displays process data received via USS on COM link.



Index:

r2018[0] : Received word 0
r2018[1] : Received word 1
r2018[2] : Received word 2
r2018[3] : Received word 3
r2018[4] : Received word 4
r2018[5] : Received word 5
r2018[6] : Received word 6
r2018[7] : Received word 7

Note:

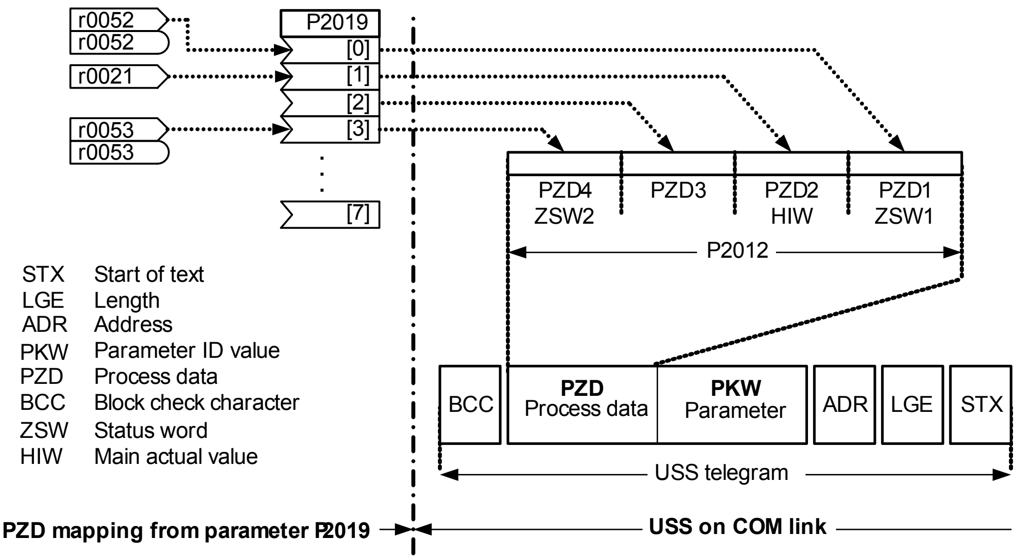
The control words can be viewed as bit parameters r2036 and r2037.

Restrictions:

- If the above serial interface controls the inverter (P0700 or P0719) then the 1st control word must be transferred in the 1st PZD-word.
- If the setpoint source is selected via P1000 or P0719, then the main setpoint must be transfered in the 2nd PZD-word,
- When P2012 is greater than or equal to 4 the additional control word (2nd control word) must transferred in the 4th PZD-word, if the above serial interface controls the inverter (P0700 or P0719).

P2019[8]	**CI: PZD to COM link (USS)**			**Min:**	0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:**	52:0	**3**
	P-Group: COMM	**Active:** Immediately	**QuickComm.:** No	**Max:**	4000:0	

Selects signals (process data PZD) to be transmitted to serial interface via USS on COM link



Index:

P2019[0] : Transmitted word 0
P2019[1] : Transmitted word 1
P2019[2] : Transmitted word 2
P2019[3] : Transmitted word 3
P2019[4] : Transmitted word 4
P2019[5] : Transmitted word 5
P2019[6] : Transmitted word 6
P2019[7] : Transmitted word 7

Details:

See P2016 (PZD to BOP link)

r2024[2]	**USS error-free telegrams**			**Min:**	-	Level
		Datatype: U16	**Unit:** -	**Def:**	-	**3**
	P-Group: COMM			**Max:**	-	

Displays number of error-free USS telegrams received.

Index:

r2024[0] : Serial interface COM link
r2024[1] : Serial interface BOP link

r2025[2]	**USS rejected telegrams**			**Min:**	-	Level
		Datatype: U16	**Unit:** -	**Def:**	-	**3**
	P-Group: COMM			**Max:**	-	

Displays the number of rejected USS telegrams. The sum of all USS errors (r2026 - r2031) is displayed in parameter r2025.

The following monitoring mechanisms have been implemented

- when a telegram is received, then initially, the correct start of a telegram (start interval + STX) must be identified and then the length must be evaluated (LGE). If the length does not correspond to the selected value for a fixed telegram or it does not have a valid value for a variable telegram length, the telegram is rejected.
- the appropriate times are monitored before and while receiving telegrams.
- the block check character (BCC) is generated while the telegram is received and after the complete telegram has been read-in, this is compared with the received BCC. If these do not match, then the telegram is not evaluated.
- if a character frame error or a parity error has not occurred in any of the received characters, then the node number (ADR) of the received telegram can be evaluated.
- the telegram is rejected if the address byte (ADR) does not correspond to the node number (for slave) or the expected slave node number (for the master).

Index:

r2025[0] : Serial interface COM link
r2025[1] : Serial interface BOP link

r2026[2]	**USS character frame error**		Min: -	Level
	P-Group: COMM	**Datatype:** U16 **Unit:** -	Def: - Max: -	**3**

Displays number of USS character frame errors.

Index:

r2026[0] : Serial interface COM link
r2026[1] : Serial interface BOP link

r2027[2]	**USS overrun error**		Min: -	Level
	P-Group: COMM	**Datatype:** U16 **Unit:** -	Def: - Max: -	**3**

Displays number of USS telegrams with overrun error.

Index:

r2027[0] : Serial interface COM link
r2027[1] : Serial interface BOP link

r2028[2]	**USS parity error**		Min: -	Level
	P-Group: COMM	**Datatype:** U16 **Unit:** -	Def: - Max: -	**3**

Displays number of USS telegrams with parity error.

Index:

r2028[0] : Serial interface COM link
r2028[1] : Serial interface BOP link

r2029[2]	**USS start not identified**		Min: -	Level
	P-Group: COMM	**Datatype:** U16 **Unit:** -	Def: - Max: -	**3**

Displays number of USS telegrams with unidentified start.

Index:

r2029[0] : Serial interface COM link
r2029[1] : Serial interface BOP link

r2030[2]	**USS BCC error**		Min: -	Level
	P-Group: COMM	**Datatype:** U16 **Unit:** -	Def: - Max: -	**3**

Displays number of USS telegrams with BCC error.

Index:

r2030[0] : Serial interface COM link
r2030[1] : Serial interface BOP link

r2031[2]	**USS length error**		Min: -	Level
	P-Group: COMM	**Datatype:** U16 **Unit:** -	Def: - Max: -	**3**

Displays number of USS telegrams with incorrect length.

Index:

r2031[0] : Serial interface COM link
r2031[1] : Serial interface BOP link

r2032	**BO: CtrlWrd1 from BOP link (USS)**		Min: -	Level
	P-Group: COMM	**Datatype:** U16 **Unit:** -	Def: - Max: -	**3**

Displays control word 1 from BOP link (word 1 within USS).

Bitfields:

Bit00	ON/OFF1	0 NO	1 YES
Bit01	OFF2: Electrical stop	0 YES	1 NO
Bit02	OFF3: Fast stop	0 YES	1 NO
Bit03	Pulses enabled	0 NO	1 YES
Bit04	RFG enable	0 NO	1 YES
Bit05	RFG start	0 NO	1 YES
Bit06	Setpoint enable	0 NO	1 YES
Bit07	Fault acknowledge	0 NO	1 YES
Bit08	JOG right	0 NO	1 YES
Bit09	JOG left	0 NO	1 YES
Bit10	Control from PLC	0 NO	1 YES
Bit11	Reverse (setpoint inversion)	0 NO	1 YES
Bit13	Motor potentiometer MOP up	0 NO	1 YES
Bit14	Motor potentiometer MOP down	0 NO	1 YES
Bit15	CDS Bit 0 (Local/Remote)	0 NO	1 YES

r2033 BO: CtrlWrd2 from BOP link (USS)

Datatype: U16	**Unit:** -	**Min:** -	Level
P-Group: COMM		**Def:** -	**3**
		Max: -	

Displays control word 2 from BOP link (i.e. word 4 within USS).

Bitfields:

Bit00	Fixed frequency Bit 0	0 NO	1 YES
Bit01	Fixed frequency Bit 1	0 NO	1 YES
Bit02	Fixed frequency Bit 2	0 NO	1 YES
Bit03	Fixed frequency Bit 3	0 NO	1 YES
Bit04	Drive data set (DDS) Bit 0	0 NO	1 YES
Bit05	Drive data set (DDS) Bit 1	0 NO	1 YES
Bit08	PID enabled	0 NO	1 YES
Bit09	DC brake enabled	0 NO	1 YES
Bit11	Droop enabled	0 NO	1 YES
Bit12	Torque control	0 NO	1 YES
Bit13	External fault 1	0 YES	1 NO
Bit15	Command data set (CDS) Bit 1	0 NO	1 YES

Dependency:

P0700 = 4 (USS on BOP link) and P0719 = 0 (Cmd / Setpoint = BICO parameter).

r2036 BO: CtrlWrd1 from COM link (USS)

Datatype: U16	**Unit:** -	**Min:** -	Level
P-Group: COMM		**Def:** -	**3**
		Max: -	

Displays control word 1 from COM link (i.e. word 1 within USS).

Bitfields:

Bit00	ON/OFF1	0 NO	1 YES
Bit01	OFF2: Electrical stop	0 YES	1 NO
Bit02	OFF3: Fast stop	0 YES	1 NO
Bit03	Pulses enabled	0 NO	1 YES
Bit04	RFG enable	0 NO	1 YES
Bit05	RFG start	0 NO	1 YES
Bit06	Setpoint enable	0 NO	1 YES
Bit07	Fault acknowledge	0 NO	1 YES
Bit08	JOG right	0 NO	1 YES
Bit09	JOG left	0 NO	1 YES
Bit10	Control from PLC	0 NO	1 YES
Bit11	Reverse (setpoint inversion)	0 NO	1 YES
Bit13	Motor potentiometer MOP up	0 NO	1 YES
Bit14	Motor potentiometer MOP down	0 NO	1 YES
Bit15	CDS Bit 0 (Local/Remote)	0 NO	1 YES

Details:

See r2033 (control word 2 from BOP link).

r2037 BO: CtrlWrd2 from COM link (USS)

Datatype: U16	**Unit:** -	**Min:** -	Level
P-Group: COMM		**Def:** -	**3**
		Max: -	

Displays control word 2 from COM link (i.e. word 4 within USS).

Bitfields:

Bit00	Fixed frequency Bit 0	0 NO	1 YES
Bit01	Fixed frequency Bit 1	0 NO	1 YES
Bit02	Fixed frequency Bit 2	0 NO	1 YES
Bit03	Fixed frequency Bit 3	0 NO	1 YES
Bit04	Drive data set (DDS) Bit 0	0 NO	1 YES
Bit05	Drive data set (DDS) Bit 1	0 NO	1 YES
Bit08	PID enabled	0 NO	1 YES
Bit09	DC brake enabled	0 NO	1 YES
Bit11	Droop enabled	0 NO	1 YES
Bit12	Torque control	0 NO	1 YES
Bit13	External fault 1	0 YES	1 NO
Bit15	Command data set (CDS) Bit 1	0 NO	1 YES

Details:

See r2033 (control word 2 from BOP link).

P2040	**CB telegram off time**			**Min:**	0	Level **3**
	CStat: CT	**Datatype:** U16	**Unit:** ms	**Def:**	20	
	P-Group: COMM	**Active:** Immediately	**QuickComm.:** No	**Max:**	65535	

Defines time after which a fault will be generated (F0070) if no telegram is received via the link.

The telegramm off time defines the time, within which a valid telegram must be received. If no valid telegram is received within that time, the inverter trips with F0070.

Dependency:

Setting 0 = watchdog disabled

P2041[5]	**CB parameter**			**Min:**	0	Level **3**
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:**	0	
	P-Group: COMM	**Active:** first confirm	**QuickComm.:** No	**Max:**	65535	

Configures a communication board (CB).

Index:

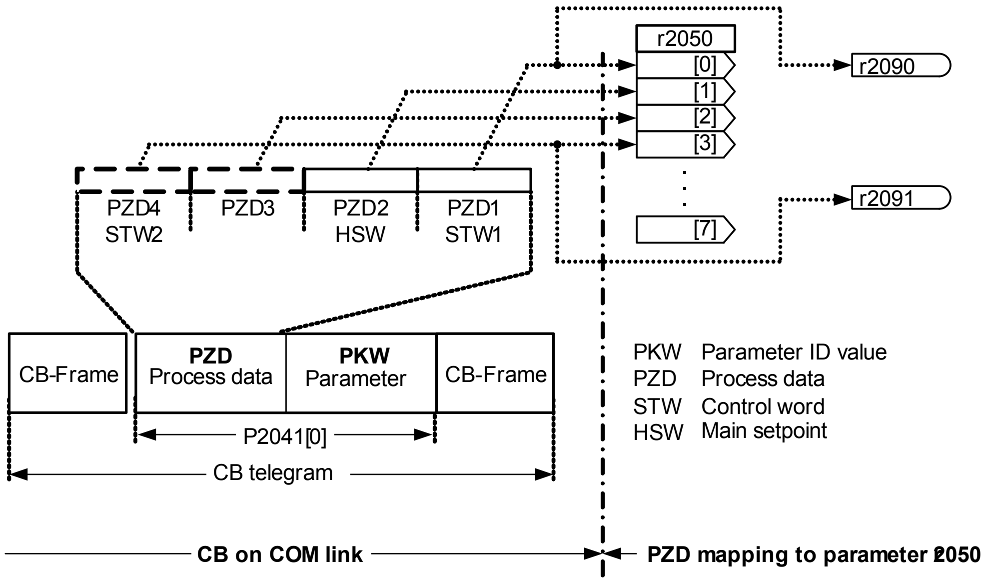
P2041[0] : CB parameter 0
P2041[1] : CB parameter 1
P2041[2] : CB parameter 2
P2041[3] : CB parameter 3
P2041[4] : CB parameter 4

Details:

See relevant communication board manual for protocol definition and appropriate settings.

r2050[8]	**CO: PZD from CB**			**Min:**	-	Level **3**
		Datatype: U16	**Unit:** -	**Def:**	-	
	P-Group: COMM			**Max:**	-	

Displays PZD received from communication board (CB).



Index:

r2050[0] : Received word 0
r2050[1] : Received word 1
r2050[2] : Received word 2
r2050[3] : Received word 3
r2050[4] : Received word 4
r2050[5] : Received word 5
r2050[6] : Received word 6
r2050[7] : Received word 7

Note:

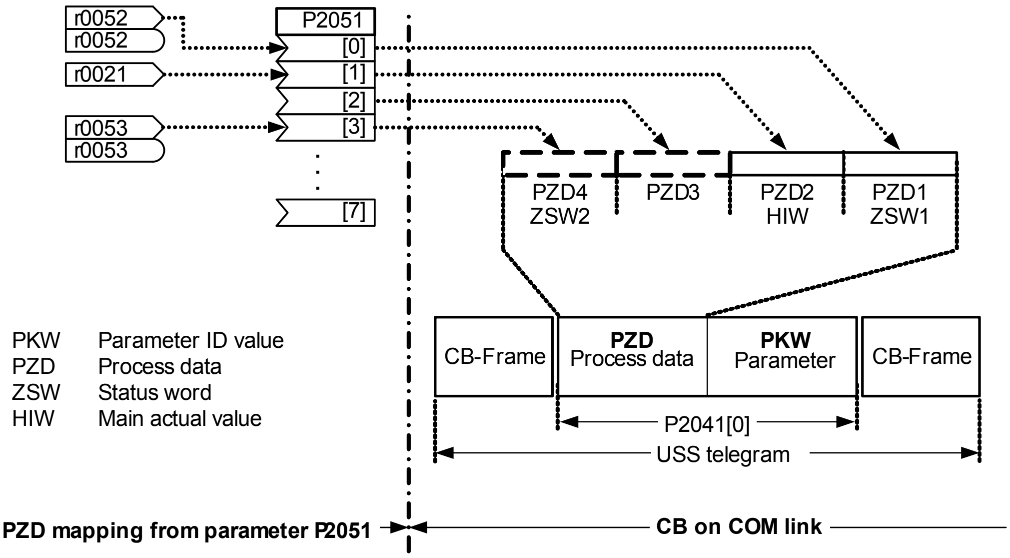
The control words can be viewed as bit parameters r2090 and r2091.

Restrictions:

- If the above serial interface controls the inverter (P0700 or P0719) then the 1st control word must be transferred in the 1st PZD-word.
- If the setpoint source is selected via P1000 or P0719, then the main setpoint must be transfered in the 2nd PZD-word,
- When P2012 is greater than or equal to 4 the additional control word (2nd control word) must transferred in the 4th PZD-word, if the above serial interface controls the inverter (P0700 or P0719).

P2051[8]	**CI: PZD to CB**			**Min:** 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 52:0	**3**
	P-Group: COMM	**Active:** Immediately	**QuickComm.:** No	**Max:** 4000:0	

Selects signals (process data PZD) to be transmitted via CB on COM link



Index:

P2051[0] : Transmitted word 0
P2051[1] : Transmitted word 1
P2051[2] : Transmitted word 2
P2051[3] : Transmitted word 3
P2051[4] : Transmitted word 4
P2051[5] : Transmitted word 5
P2051[6] : Transmitted word 6
P2051[7] : Transmitted word 7

Common Settings:

- Status word 1 = 52 CO/BO: Act. status word 1 (see r0052)
- Actual value 1 = 21 inverter output frequency (see r0021)
- Other BICO settings are possible

r2053[5]	**CB identification**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: COMM			**Max:** -	

Displays identification data of the communication board (CB). The different CB types (r2053[0]) are given in the Enum declaration.

Possible Settings:

0 No CB option board
1 PROFIBUS DP
2 DeviceNet
256 not defined

Index:

r2053[0] : CB type (PROFIBUS = 1)
r2053[1] : Firmware version
r2053[2] : Firmware version detail
r2053[3] : Firmware date (year)
r2053[4] : Firmware date (day/month)

r2054[7]	**CB diagnosis**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: COMM			**Max:** -	

Displays diagnostic information of communication board (CB).

Index:

r2054[0] : CB diagnosis 0
r2054[1] : CB diagnosis 1
r2054[2] : CB diagnosis 2
r2054[3] : CB diagnosis 3
r2054[4] : CB diagnosis 4
r2054[5] : CB diagnosis 5
r2054[6] : CB diagnosis 6

Details:

See relevant communications board manual.

r2090	**BO: Control word 1 from CB**		**Min:** -	Level
		Datatype: U16 **Unit:** -	**Def:** -	**3**
	P-Group: COMM		**Max:** -	

Displays control word 1 received from communication board (CB).

Bitfields:

Bit00	ON/OFF1	0	NO	1	YES
Bit01	OFF2: Electrical stop	0	YES	1	NO
Bit02	OFF3: Fast stop	0	YES	1	NO
Bit03	Pulses enabled	0	NO	1	YES
Bit04	RFG enable	0	NO	1	YES
Bit05	RFG start	0	NO	1	YES
Bit06	Setpoint enable	0	NO	1	YES
Bit07	Fault acknowledge	0	NO	1	YES
Bit08	JOG right	0	NO	1	YES
Bit09	JOG left	0	NO	1	YES
Bit10	Control from PLC	0	NO	1	YES
Bit11	Reverse (setpoint inversion)	0	NO	1	YES
Bit13	Motor potentiometer MOP up	0	NO	1	YES
Bit14	Motor potentiometer MOP down	0	NO	1	YES
Bit15	CDS Bit 0 (Local/Remote)	0	NO	1	YES

Details:

See relevant communication board manual for protocol definition and appropriate settings.

r2091	**BO: Control word 2 from CB**		**Min:** -	Level
		Datatype: U16 **Unit:** -	**Def:** -	**3**
	P-Group: COMM		**Max:** -	

Displays control word 2 received from communication board (CB).

Bitfields:

Bit00	Fixed frequency Bit 0	0	NO	1	YES
Bit01	Fixed frequency Bit 1	0	NO	1	YES
Bit02	Fixed frequency Bit 2	0	NO	1	YES
Bit03	Fixed frequency Bit 3	0	NO	1	YES
Bit04	Drive data set (DDS) Bit 0	0	NO	1	YES
Bit05	Drive data set (DDS) Bit 1	0	NO	1	YES
Bit08	PID enabled	0	NO	1	YES
Bit09	DC brake enabled	0	NO	1	YES
Bit11	Droop enabled	0	NO	1	YES
Bit12	Torque control	0	NO	1	YES
Bit13	External fault 1	0	YES	1	NO
Bit15	Command data set (CDS) Bit 1	0	NO	1	YES

Details:

See relevant communication board manual for protocol definition and appropriate settings.

3.35 Faults, Alarms, Monitoring

P2100[3] Alarm number selection

CStat: CT	**Datatype:** U16	**Unit:** -	**Min:** 0	**Def:** 0	Level 3
P-Group: ALARMS	**Active:** first confirm	**QuickComm.:** No	**Max:** 65535		

Selects up to 3 faults or warnings for non-default reactions.

Index:

P2100[0] : Fault Number 1
P2100[1] : Fault Number 2
P2100[2] : Fault Number 3

Example:

If you want F0005 to perform an OFF3 instead of an OFF2, set P2100[0] = 5, then select the desired reaction in P2101[0] (in this case, set P2101[0] = 3).

Note:

All fault codes have a default reaction to OFF2. Some fault codes caused by hardware trips (e.g. overcurrent) cannot be changed from the default reactions.

P2101[3] Stop reaction value

CStat: CT	**Datatype:** U16	**Unit:** -	**Min:** 0	**Def:** 0	Level 3
P-Group: ALARMS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4		

Sets drive stop reaction values for fault selected by P2100 (alarm number stop reaction).

This indexed parameter specifies the special reaction to the faults/warnings defined in P2100 indices 0 to 2.

Possible Settings:

0 No reaction, no display
1 OFF1 stop reaction
2 OFF2 stop reaction
3 OFF3 stop reaction
4 No reaction warning only

Index:

P2101[0] : Stop reaction value 1
P2101[1] : Stop reaction value 2
P2101[2] : Stop reaction value 3

Note:

- Settings 0 - 3 only are available for fault codes.
- Settings 0 and 4 only are available for warnings.
- Index 0 (P2101) refers to fault/warning in index 0 (P2100).

P2103[3] BI: 1. Faults acknowledgement

CStat: CT	**Datatype:** U32	**Unit:** -	**Min:** 0:0	**Def:** 722:2	Level 3
P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0		

Defines first source of fault acknowledgement, e.g. keypad/DIN, etc. (depending on setting).

Index:

P2103[0] : 1st. Command data set (CDS)
P2103[1] : 2nd. Command data set (CDS)
P2103[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)

P2104[3]	BI: 2. Faults acknowledgement			Min:	0:0	Level
	CStat: CT	Datatype: U32	Unit: -	Def:	0:0	3
	P-Group: COMMANDS	Active: first confirm	QuickComm.: No	Max:	4000:0	

Selects second source of fault acknowledgement.

Index:

P2104[0] : 1st. Command data set (CDS)
P2104[1] : 2nd. Command data set (CDS)
P2104[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)

P2106[3]	BI: External fault			Min:	0:0	Level
	CStat: CT	Datatype: U32	Unit: -	Def:	1:0	3
	P-Group: COMMANDS	Active: first confirm	QuickComm.: No	Max:	4000:0	

Selects source of external faults.

Index:

P2106[0] : 1st. Command data set (CDS)
P2106[1] : 2nd. Command data set (CDS)
P2106[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)

r2110[4]	Warning number			Min:	-	Level
		Datatype: U16	Unit: -	Def:	-	2
	P-Group: ALARMS			Max:	-	

Displays warning information.

A maximum of 2 active warnings (indices 0 and 1) and 2 historical warnings (indices 2 and 3) may be viewed.

Index:

r2110[0] : Recent Warnings --, warning 1
r2110[1] : Recent Warnings --, warning 2
r2110[2] : Recent Warnings -1, warning 3
r2110[3] : Recent Warnings -1, warning 4

Note:

- Indices 0 and 1 are not stored.
- The keypad will flash while a warning is active. The LEDs indicate the warning status in this case.

- If an AOP is in use, the display will show number and text of the active warning.

P2111	Total number of warnings			Min:	0	Level
	CStat: CT	Datatype: U16	Unit: -	Def:	0	3
	P-Group: ALARMS	Active: first confirm	QuickComm.: No	Max:	4	

Displays number of warning (up to 4) since last reset. Set to 0 to reset the warning history.

r2114[2]	Run time counter			Min: -	Level
		Datatype: U16	Unit: -	Def: -	3
	P-Group: ALARMS			Max: -	

Displays run time counter.

It is the total time the drive has been powered up. When power goes value is saved, then restored on powerup. The run time counter r2114 will be calculate as followed:
- Multiply the value in r2114[0], by 65536 and then add it to the value in r2114[1].
- The resultant answer will be in seconds.

When AOP is not connected, the time in this parameter is used by r0948 to indicate when a fault has occured.

Index:

r2114[0] : System Time, Seconds, Upper Word
r2114[1] : System Time, Seconds, Lower Word

Example:

If r2114[0] = 1 & r2114[1] = 20864
We get 1 * 65536 + 20864 = 86400 seconds which equals 1 day.

P2115[3]	AOP real time clock			Min: 0	Level
	CStat: CT	Datatype: U16	Unit: -	Def: 0	3
	P-Group: ALARMS	Active: Immediately	QuickComm.: No	Max: 65535	

Displays AOP real time.

All of the frequency inverters have an internal time generator function which is used to time-stamp and log erroneous conditions. Therefore there is no battery-buffered real-time clock (RTC). The frequency inverters can support a software-controlled RTC where the RTC must be set from the AOP or via an interface. When using the AOP, this synchronization is automatic. When a serial interface is used, a task must be sent from the higher-level control to write into the parameter. If the AOP is withdrawn during operation, or if the bus is interrupted, then the real-time clock runs further using the runtime counter. The real-time clock is reset to zero only after power off.

The time is stored in a word array parameter P2115. This parameter number is common to all invertes. Inverters not supporting this feature would respond with parameter not recognised - a Master will ignore this. The time will be set by USS Protocol standard word array parameter write telegrams.

Within the AOP, while it is acting as a USS Master, at each tick of the heartbeat, the list of available USS Slaves will be flagged with a time update request. As the Master runs around the list of USS slaves on its next USS update cycle, if there are no higher priority tasks to perform, and the slave still has its time update flag set, then an array parameter write telegram will be issued, containing the current time. The request for that slave is cancelled if the slave responds correctly. The AOP will not need to read the time from the slave.

Time is maintained in a word array parameter and encoded as follows - the same format will be used in fault report logs.

Index	High Byte (MSB)	Low Byte (LSB)
0	Seconds (0 - 59)	Minutes (0 - 59)
1	Hours (0 - 23)	Days (1 - 31)
2	Month (1 - 12)	Years (00 - 250)

Time is measured from Jan 1st 2000. Values are in binary form.

Index:

P2115[0] : Real Time, Seconds+Minutes
P2115[1] : Real Time, Hours+Days
P2115[2] : Real Time, Month+Year

Example:

P2115[0] = 13625
P2115[1] = 2579
P2115[2] = 516

The conversion into binary quantities (U16) results in the following bit pattern:
Seconds + minutes:
- High byte (MSB) = 00110101 corresponding to the number 53, i.e. seconds 53
- Low byte (LSB) = 00111001 corresponding to the number 57, i.e. minutes 57

Hours + days:
- High byte (MSB) = 00001010 corresponding to the number 10, i.e. hours 10
- Low byte (LSB) = 00010011 corresponding to the number 19, i.e. days 19

Months + year:
- High byte (MSB) = 00000010 corresponding to the number 2, i.e. months 2
- Low byte (LSB) = 00000100 corresponding to the number 4, i.e. years 4

This means that the real time displayed in P2115 is 19.02.2004, 10:57:53.

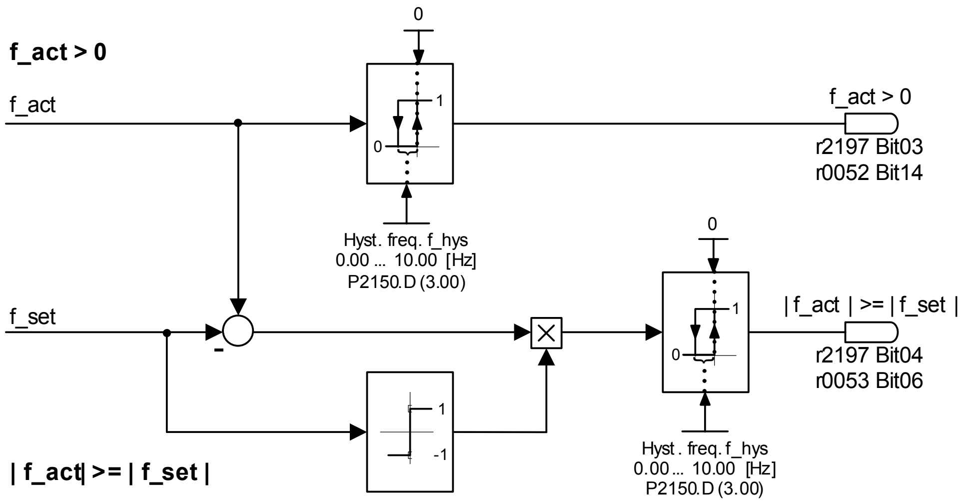
P2120	**Indication counter**			**Min:** 0	Level **4**
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 65535	

Indicates total number of alarm events. This parameter is incremented whenever an alarm event occurs. It also gets incremented when a warning is cleared or faults are cleared.

This parameter is used by the PC tools.

P2150[3]	**Hysteresis frequency f_hys**			**Min:** 0.00	Level **3**
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 3.00	
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 10.00	

Defines hysteresis level applied for comparing frequency and speed to threshold as illustrated in the diagram below.



Index:

P2150[0] : 1st. Drive data set (DDS)
P2150[1] : 2nd. Drive data set (DDS)
P2150[2] : 3rd. Drive data set (DDS)

P2153[3]	**Time-constant frequency filter**			**Min:** 0	Level **2**
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 5	
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 1000	

Specifies time constant of first-order frequency filter. The filtered frequency is then compared to the thresholds.

Index:

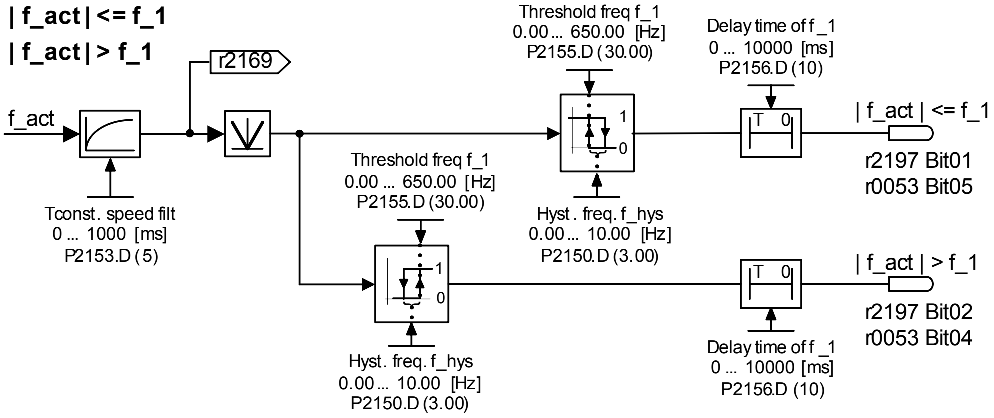
P2153[0] : 1st. Drive data set (DDS)
P2153[1] : 2nd. Drive data set (DDS)
P2153[2] : 3rd. Drive data set (DDS)

Details:

See diagram in P2155, P2157 and P2159

P2155[3]	Threshold frequency f_1		Min: 0.00	Level 3
	CStat: CUT	Datatype: Float	Unit: Hz	Def: 30.00
	P-Group: ALARMS	Active: Immediately	QuickComm.: No	Max: 650.00

Sets a threshold for comparing actual frequency or frequency to threshold values f_1. This threshold controls status bits 4 and 5 in status word 2 (r0053).



Index:

P2155[0] : 1st. Drive data set (DDS)
P2155[1] : 2nd. Drive data set (DDS)
P2155[2] : 3rd. Drive data set (DDS)

P2156[3]	Delay time of threshold freq f_1		Min: 0	Level 3
	CStat: CUT	Datatype: U16	Unit: ms	Def: 10
	P-Group: ALARMS	Active: Immediately	QuickComm.: No	Max: 10000

Sets delay time prior to threshold frequency f_1 comparison (P2155).

Index:

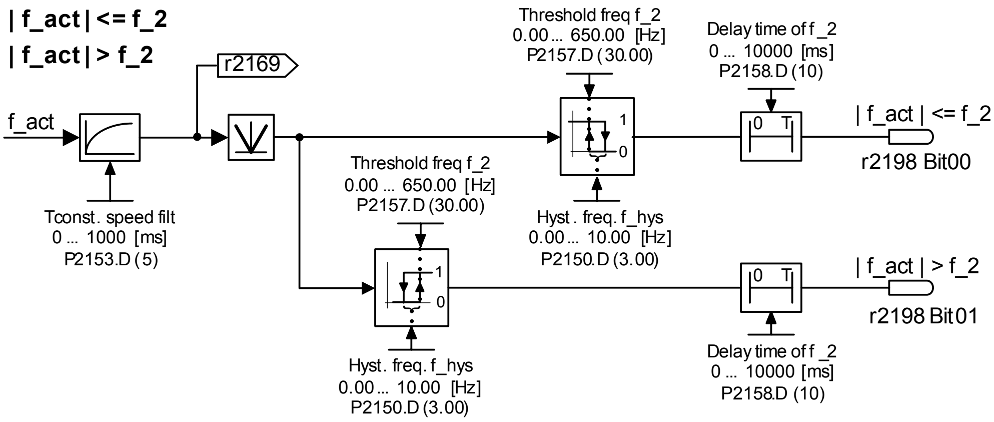
P2156[0] : 1st. Drive data set (DDS)
P2156[1] : 2nd. Drive data set (DDS)
P2156[2] : 3rd. Drive data set (DDS)

Details:

See diagram in P2155 (threshold frequency f_1)

P2157[3]	Threshold frequency f_2		Min: 0.00	Level 2
	CStat: CUT	Datatype: Float	Unit: Hz	Def: 30.00
	P-Group: ALARMS	Active: Immediately	QuickComm.: No	Max: 650.00

Threshold_2 for comparing frequency or frequency to thresholds as illustrated in the diagram below.



Index:

P2157[0] : 1st. Drive data set (DDS)
P2157[1] : 2nd. Drive data set (DDS)
P2157[2] : 3rd. Drive data set (DDS)

P2158[3]	Delay time of threshold freq f_2		Min: 0	Level 2
	CStat: CUT	Datatype: U16	Unit: ms	Def: 10
	P-Group: ALARMS	Active: Immediately	QuickComm.: No	Max: 10000

Delay time for comparing frequency to threshold f_2 (P2157).

Index:

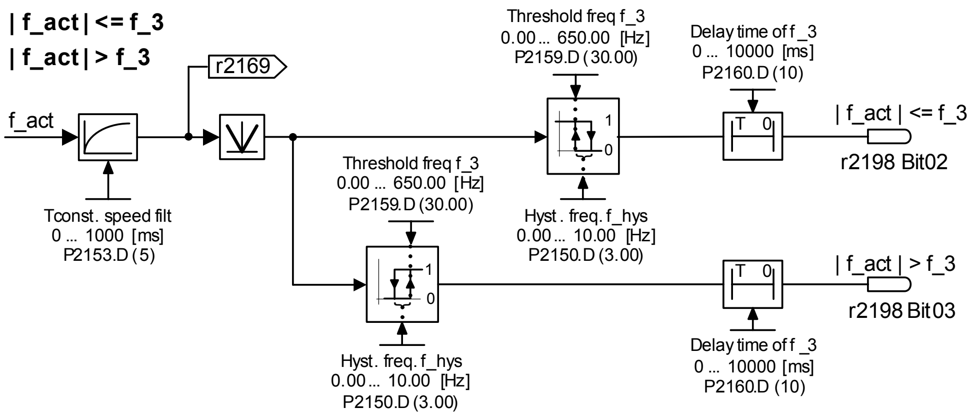
P2158[0] : 1st. Drive data set (DDS)
P2158[1] : 2nd. Drive data set (DDS)
P2158[2] : 3rd. Drive data set (DDS)

Details:

See diagram in P2157 (threshold frequency f_2)

P2159[3]	Threshold frequency f_3			Min:	0.00	Level
	CStat: CUT	Datatype: Float	Unit: Hz	Def:	30.00	2
	P-Group: ALARMS	Active: Immediately	QuickComm.: No	Max:	650.00	

Threshold_3 for comparing frequency to thresholds.



Index:

P2159[0] : 1st. Drive data set (DDS)
P2159[1] : 2nd. Drive data set (DDS)
P2159[2] : 3rd. Drive data set (DDS)

P2160[3]	Delay time of threshold freq f_3			Min:	0	Level
	CStat: CUT	Datatype: U16	Unit: ms	Def:	10	2
	P-Group: ALARMS	Active: Immediately	QuickComm.: No	Max:	10000	

Delay time for comparing frequency to threshold f_3 (P2159).

Index:

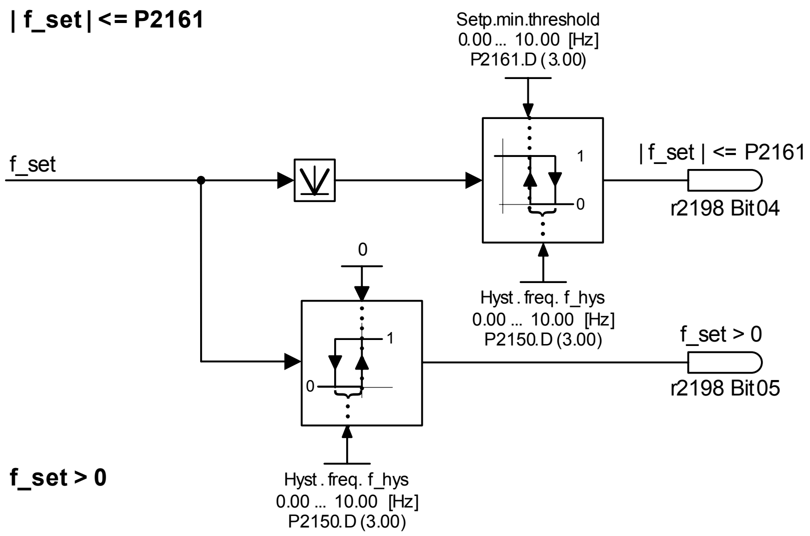
P2160[0] : 1st. Drive data set (DDS)
P2160[1] : 2nd. Drive data set (DDS)
P2160[2] : 3rd. Drive data set (DDS)

Details:

See diagram in P2159 (threshold frequency f_3)

P2161[3]	Min. threshold for freq. setp.			Min:	0.00	Level
	CStat: CUT	Datatype: Float	Unit: Hz	Def:	3.00	2
	P-Group: ALARMS	Active: Immediately	QuickComm.: No	Max:	10.00	

Minimum threshold value for comparing frequency setpoint.

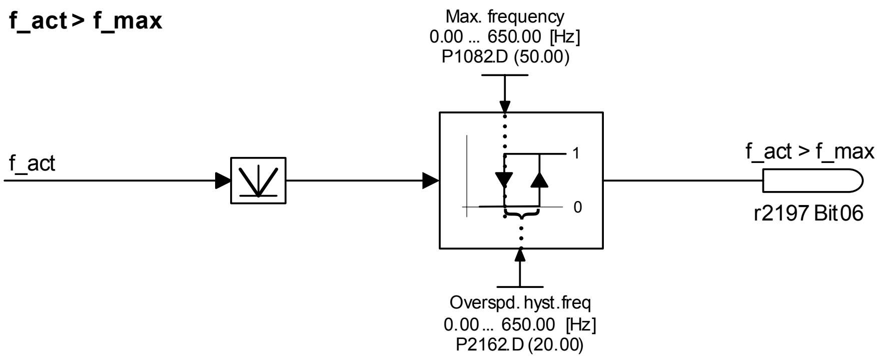


Index:

P2161[0] : 1st. Drive data set (DDS)
P2161[1] : 2nd. Drive data set (DDS)
P2161[2] : 3rd. Drive data set (DDS)

P2162[3]	**Hysteresis freq. for overfreq.**			**Min:**	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	20.00	**2**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

Hysteresis frequency for overfrequency-detection as illustrated in the diagram below.



Index:

P2162[0] : 1st. Drive data set (DDS)
P2162[1] : 2nd. Drive data set (DDS)
P2162[2] : 3rd. Drive data set (DDS)

P2163[3]	**Entry freq. for perm. deviation**			**Min:**	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	3.00	**2**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:**	20.00	

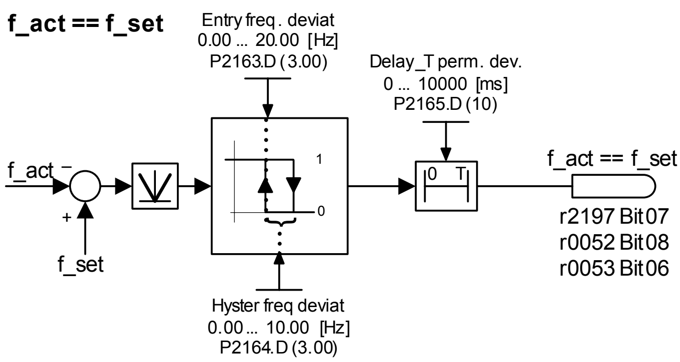
Threshold for detecting frequency deviation from setpoint as illustrated in the diagram P2164.

Index:

P2163[0] : 1st. Drive data set (DDS)
P2163[1] : 2nd. Drive data set (DDS)
P2163[2] : 3rd. Drive data set (DDS)

P2164[3]	**Hysteresis frequency deviation**			**Min:**	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	3.00	**3**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:**	10.00	

Hysteresis frequency for detecting permitted deviation (from setpoint). This frequency controls bit 8 in status word 1 (r0052) and bit 6 in status word 2 (r0053).



Index:

P2164[0] : 1st. Drive data set (DDS)
P2164[1] : 2nd. Drive data set (DDS)
P2164[2] : 3rd. Drive data set (DDS)

P2165[3]	**Delay time permitted deviation**			**Min:**	0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:**	10	**2**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:**	10000	

Delay time for detecting permitted deviation of frequency from setpoint.

Index:

P2165[0] : 1st. Drive data set (DDS)
P2165[1] : 2nd. Drive data set (DDS)
P2165[2] : 3rd. Drive data set (DDS)

Details:

See diagram in P2164.

P2166[3]	**Delay time ramp up completed**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 10	**2**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 10000	

Delay time for signal that indicates completion of ramp-up.

Index:

P2166[0] : 1st. Drive data set (DDS)
P2166[1] : 2nd. Drive data set (DDS)
P2166[2] : 3rd. Drive data set (DDS)

Details:

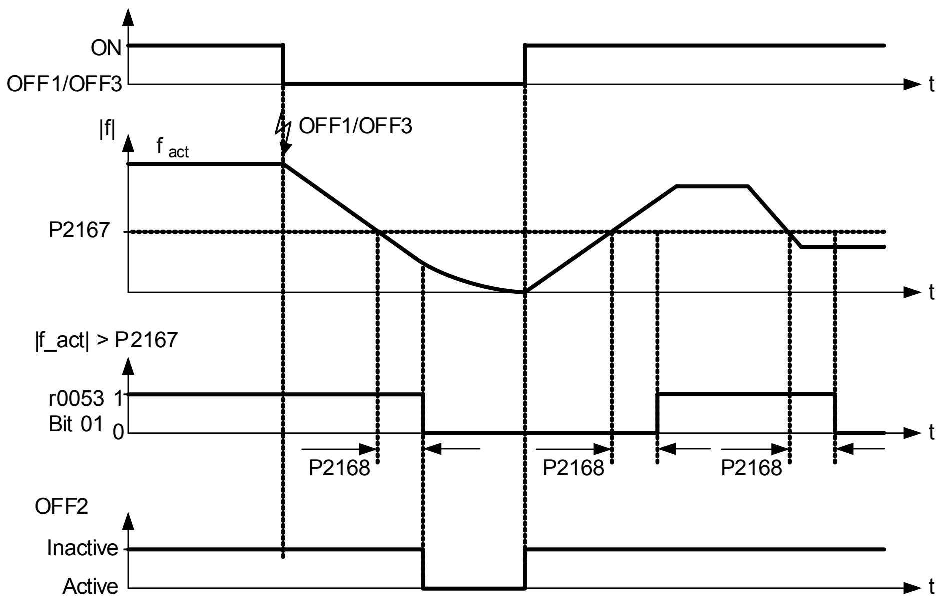
See diagram in P2174.

P2167[3]	**Switch-off frequency f_off**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:** 1.00	**3**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 10.00	

Defines the threshold of the monitoring function |f_act| <= P2167 (f_off).

P2167 influences following functions:
- If the actual frequency falls below this threshold and the time delay has expired, bit 1 in status word 2 (r0053) is reset.
- If a OFF1 or OFF3 was applied and bit 1 is reset the inverter will disable the pulse (OFF2).

Restriction:
- The monitoring function |f_act| <= P2167 (f_off) is not updated and pulses are not disabled, if motor holding brake (MHB, P1215 = 1) is enabled.



Index:

P2167[0] : 1st. Drive data set (DDS)
P2167[1] : 2nd. Drive data set (DDS)
P2167[2] : 3rd. Drive data set (DDS)

P2168[3]	**Delay time T_off**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 10	**3**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 10000	

Defines time for which the inverter may operate below switch-off frequency (P2167) before switch off occurs.

Index:

P2168[0] : 1st. Drive data set (DDS)
P2168[1] : 2nd. Drive data set (DDS)
P2168[2] : 3rd. Drive data set (DDS)

Dependency:

Active if holding brake (P1215) not parameterized.

Details:

See diagram in P2167 (switch-off frequency)

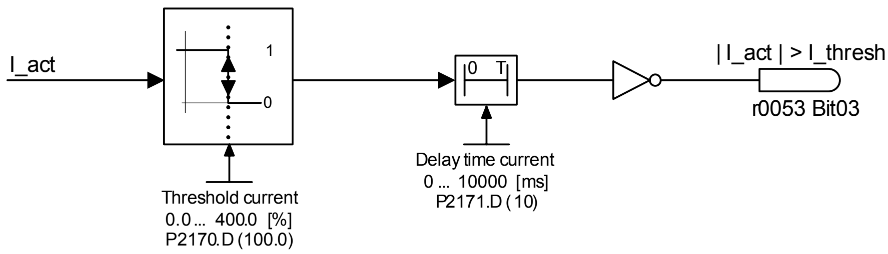
r2169	**CO: Act. filtered frequency 3**		**Min:** -	Level
		Datatype: Float	**Unit:** Hz	**Def:** -	**2**
	P-Group: ALARMS			**Max:** -	

Filtered frequency for monitoring behind first-order lowpass filter.
- |f_act| > f_1 (see P2155)
- |f_act| > f_2 (see P2157)
- |f_act| > f_3 (see P2159)

P2170[3]	**Threshold current I_thresh**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 100.0	**3**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 400.0	

Defines threshold current in [%] relative to P0305 (rated motor current) to be used in comparisons of I_act and I_Thresh as illustrated in the diagram below.

|I_act| > I_thresh



Index:

P2170[0] : 1st. Drive data set (DDS)
P2170[1] : 2nd. Drive data set (DDS)
P2170[2] : 3rd. Drive data set (DDS)

Note:

This threshold controls bit 3 in status word 3 (r0053).

P2171[3]	**Delay time current**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 10	**3**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 10000	

Defines delay time prior to activation of current comparison.

Index:

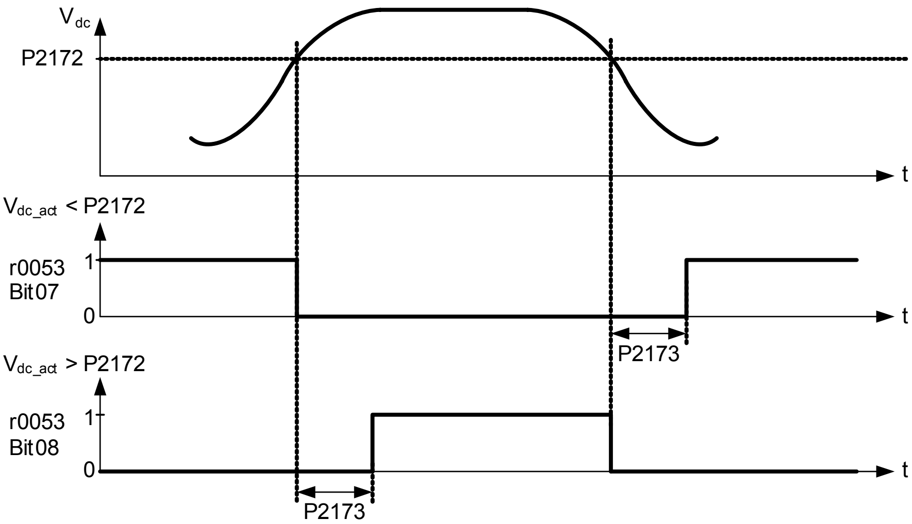
P2171[0] : 1st. Drive data set (DDS)
P2171[1] : 2nd. Drive data set (DDS)
P2171[2] : 3rd. Drive data set (DDS)

Details:

See diagram in P2170 (threshold current I_thresh)

P2172[3]	**Threshold DC-link voltage**			**Min:** 0	Level **3**
	CStat: CUT	**Datatype:** U16	**Unit:** V	**Def:** 800	
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 2000	

Defines DC link voltage to be compared to actual voltage as illustrated in the diagram below.



Index:

P2172[0] : 1st. Drive data set (DDS)
P2172[1] : 2nd. Drive data set (DDS)
P2172[2] : 3rd. Drive data set (DDS)

Note:

This voltage controls bits 7 and 8 in status word 3 (r0053).

P2173[3]	**Delay time DC-link voltage**			**Min:** 0	Level **3**
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 10	
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 10000	

Defines delay time prior to activation of threshold comparison.

Index:

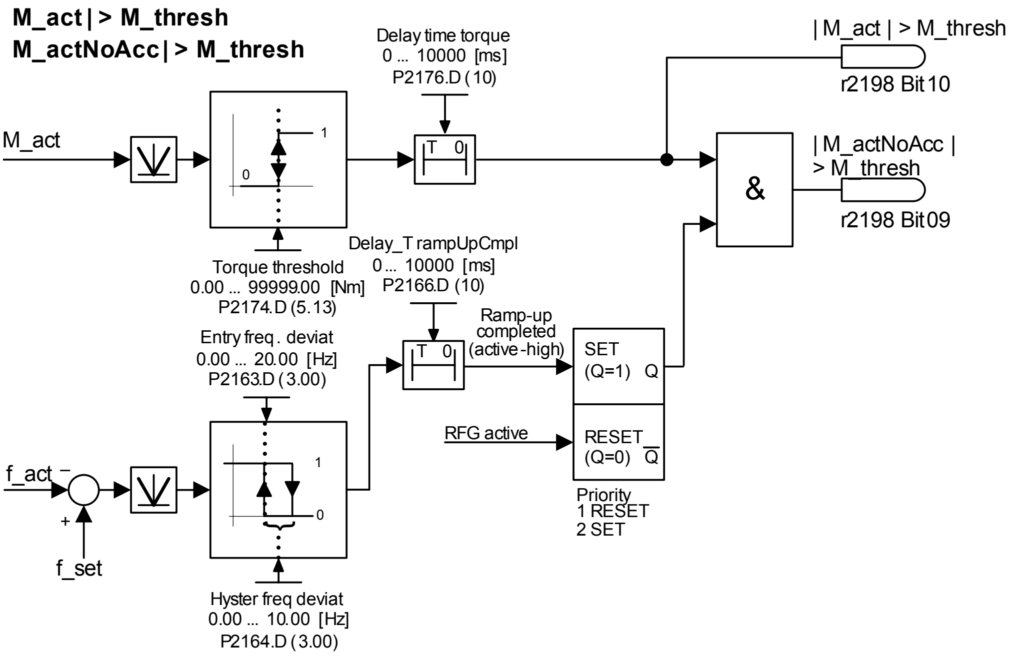
P2173[0] : 1st. Drive data set (DDS)
P2173[1] : 2nd. Drive data set (DDS)
P2173[2] : 3rd. Drive data set (DDS)

Details:

See diagram in P2172 (threshold DC-link voltage)

P2174[3]	**Torque threshold M_thresh**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Nm	**Def:** 5.13	**2**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 99999.00	

Defines torque threshold for comparing actual torque.



Index:

P2174[0] : 1st. Drive data set (DDS)
P2174[1] : 2nd. Drive data set (DDS)
P2174[2] : 3rd. Drive data set (DDS)

P2176[3]	**Delay time for torque threshold**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 10	**2**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 10000	

Delay time for comparing actual torque to threshold.

Index:

P2176[0] : 1st. Drive data set (DDS)
P2176[1] : 2nd. Drive data set (DDS)
P2176[2] : 3rd. Drive data set (DDS)

P2177[3]	**Delay time for motor is blocked**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 10	**2**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 10000	

Delay time for identification that motor is blocked.

Index:

P2177[0] : 1st. Drive data set (DDS)
P2177[1] : 2nd. Drive data set (DDS)
P2177[2] : 3rd. Drive data set (DDS)

P2178[3]	**Delay time for motor pulled out**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:** 10	**2**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 10000	

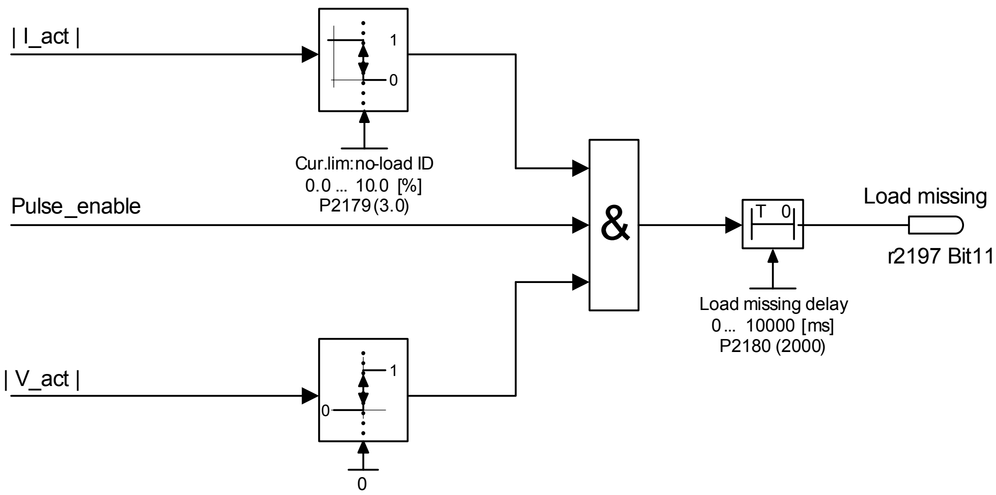
Delay time for identification that motor is pulled out.

Index:

P2178[0] : 1st. Drive data set (DDS)
P2178[1] : 2nd. Drive data set (DDS)
P2178[2] : 3rd. Drive data set (DDS)

P2179	**Current limit for no load ident.**			**Min:**	0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	3.0	**3**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:**	10.0	

Threshold current for A0922 (load missing) in [%] relative to P0305 (rated motor current) as illustrated in the diagram below.



Note:

- It may be that the motor is not connected (load missing) or a phase could be missing.
- If a motor setpoint cannot be entered and the current limit (P2179) is not exceeded, Alarm A0922 (no load applied) is issued when delay time (P2180) expires.

P2180	**Delay time for load missing**			**Min:**	0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** ms	**Def:**	2000	**3**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:**	10000	

Delay time to identify that the current is less than the threshold defined in P2179.

Details:

See diagram in P2179 (current limit for no load identification).

3.36 Load torque monitoring

P2181[3]	**Belt failure detection mode**			**Min:**	0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:**	0	**2**
	P-Group: ALARMS	**Active:** first confirm	**QuickComm.:** No	**Max:**	6	

Parameter P2181 activates or de-activates the load torque monitoring and defines the response to a load torque fault.

Using the load torque monitoring, it is possible to detect a mechanical failure or an overload condition of the mechanical transmission line, e.g. a broken drive belt or a stalled conveyor belt. In this case, the actual torque/frequency actual value is compared to a programmed envelope characteristic (refer to P2182 - P2190). If the actual torque/frequency actual value lies above or below the envelope curve, then after the delay time P2192 expires, as a function of P2181, alarm A0952 is output or the drive inverter is tripped with fault message F0452.

Possible Settings:

0 Belt failure detection disabled
1 Warning: Low torque / frequency
2 Warning: High torque / frequency
3 Warning: High / low torque / frequency
4 Trip: Low torque / frequency
5 Trip: High torque / frequency
6 Trip: High / low torque / frequency

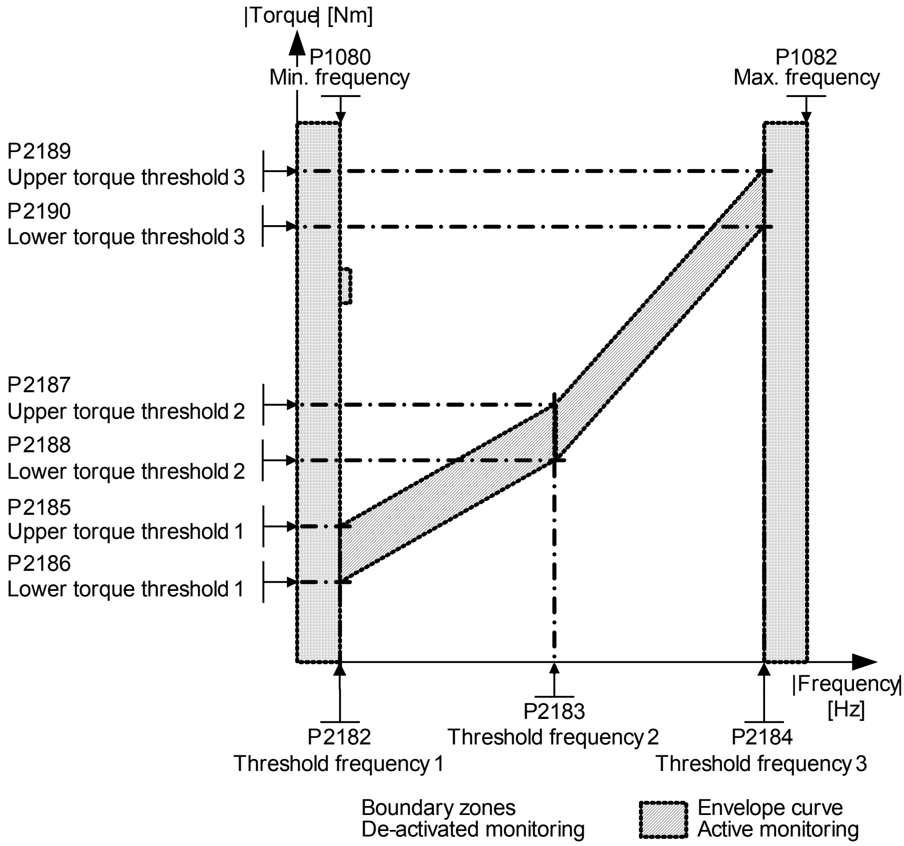
Index:

P2181[0] : 1st. Command data set (CDS)
P2181[1] : 2nd. Command data set (CDS)
P2181[2] : 3rd. Command data set (CDS)

P2182[3]	**Belt threshold frequency 1**			**Min:**	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	5.00	**3**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

Sets a frequency threshold 1 for comparing actual torque to torque the envelope for belt failure detection.

The frequency torque envelope is defined by 9 parameters - 3 are frequency parameters (P2182 - P2184), and the other 6 define the low and high torque limits (P2185 - P2190) for each frequency (see diagram below).



The allowed frequency/torque region is defined by the shaded area. When the torque falls outside the area shown, a trip or warning occurs (see parameter P2181).

Index:

P2182[0] : 1st. Drive data set (DDS)
P2182[1] : 2nd. Drive data set (DDS)
P2182[2] : 3rd. Drive data set (DDS)

Note:

- The load torque monitoring function is not active below the frequency defined in P2182 and above the frequency defined in P2184.
- The current and torque limits of the drive inverter and motor still apply over the complete frequency range.
- The drive inverter output frequency is defined using Parameter P1080 and P1082. These limits should be carefully observed for the load torque monitoring frequencies.

P2183[3]	**Belt threshold frequency 2**			**Min:**	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Def:**	30.00	**2**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:**	650.00	

Sets a threshold F2 for comparing actual torque to torque the envelope for belt failure detection.

Index:

P2183[0] : 1st. Drive data set (DDS)
P2183[1] : 2nd. Drive data set (DDS)
P2183[2] : 3rd. Drive data set (DDS)

Details:

See P2182 (belt threshold frequency 1).

P2184[3] Belt threshold frequency 3

CStat: CUT	**Datatype:** Float	**Unit:** Hz	**Min:** 0.00	**Def:** 50.00	Level
P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00		**2**

Sets a threshold F3 for comparing actual torque to torque the envelope for belt failure detection.

Index:

P2184[0] : 1st. Drive data set (DDS)
P2184[1] : 2nd. Drive data set (DDS)
P2184[2] : 3rd. Drive data set (DDS)

Details:

See P2182 (belt threshold frequency 1).

P2185[3] Upper torque threshold 1

CStat: CUT	**Datatype:** Float	**Unit:** Nm	**Min:** 0.0	**Def:** 99999.0	Level
P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 99999.0		**2**

Upper limit threshold value 1 for comparing actual torque.

Index:

P2185[0] : 1st. Drive data set (DDS)
P2185[1] : 2nd. Drive data set (DDS)
P2185[2] : 3rd. Drive data set (DDS)

Details:

See P2182 (belt threshold frequency 1).

P2186[3] Lower torque threshold 1

CStat: CUT	**Datatype:** Float	**Unit:** Nm	**Min:** 0.0	**Def:** 0.0	Level
P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 99999.0		**2**

Lower limit threshold value 1 for comparing actual torque.

Index:

P2186[0] : 1st. Drive data set (DDS)
P2186[1] : 2nd. Drive data set (DDS)
P2186[2] : 3rd. Drive data set (DDS)

Details:

See P2182 (belt threshold frequency 1).

P2187[3] Upper torque threshold 2

CStat: CUT	**Datatype:** Float	**Unit:** Nm	**Min:** 0.0	**Def:** 99999.0	Level
P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 99999.0		**2**

Upper limit threshold value 2 for comparing actual torque.

Index:

P2187[0] : 1st. Drive data set (DDS)
P2187[1] : 2nd. Drive data set (DDS)
P2187[2] : 3rd. Drive data set (DDS)

Details:

See P2182 (belt threshold frequency 1).

P2188[3] Lower torque threshold 2

CStat: CUT	**Datatype:** Float	**Unit:** Nm	**Min:** 0.0	**Def:** 0.0	Level
P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 99999.0		**2**

Lower limit threshold value 2 for comparing actual torque.

Index:

P2188[0] : 1st. Drive data set (DDS)
P2188[1] : 2nd. Drive data set (DDS)
P2188[2] : 3rd. Drive data set (DDS)

Details:

See P2182 (belt threshold frequency 1).

P2189[3] Upper torque threshold 3

CStat: CUT	**Datatype:** Float	**Unit:** Nm	**Min:** 0.0	**Def:** 99999.0	Level
P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 99999.0		**2**

Upper limit threshold value 3 for comparing actual torque.

Index:

P2189[0] : 1st. Drive data set (DDS)
P2189[1] : 2nd. Drive data set (DDS)
P2189[2] : 3rd. Drive data set (DDS)

Details:

See P2182 (belt threshold frequency 1).

P2190[3]	**Lower torque threshold 3**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** Nm	**Def:** 0.0	**2**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 99999.0	

Lower limit threshold value 3 for comparing actual torque.

Index:

P2190[0] : 1st. Drive data set (DDS)
P2190[1] : 2nd. Drive data set (DDS)
P2190[2] : 3rd. Drive data set (DDS)

Details:

See P2182 (belt threshold frequency 1).

P2192[3]	**Time delay for belt failure**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** s	**Def:** 10	**2**
	P-Group: ALARMS	**Active:** Immediately	**QuickComm.:** No	**Max:** 65	

P2192 defines a delay before warning/trip becomes active. It is used to eliminate events caused by transient conditions. It is used for both methods of fault detection.

Index:

P2192[0] : 1st. Drive data set (DDS)
P2192[1] : 2nd. Drive data set (DDS)
P2192[2] : 3rd. Drive data set (DDS)

r2197	**CO/BO: Monitoring word 1**		**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**2**
	P-Group: ALARMS			**Max:** -	

Monitoring word 1 which indicates the state of monitor functions. Each bit represents one monitor function.

Bitfields:

```
Bit00   f_act <=  P1080 (f_min)               0  NO        1  YES
Bit01   f_act <=  P2155 (f_1)                 0  NO        1  YES
Bit02   f_act >   P2155 (f_1)                 0  NO        1  YES
Bit03   f_act >   zero                        0  NO        1  YES

Bit04   f_act >=  setp. (f_set)               0  NO        1  YES
Bit05   f_act <=  P2167 (f_off)               0  NO        1  YES
Bit06   f_act >=  P1082 (f_max)               0  NO        1  YES
Bit07   f_act ==  setp. (f_set)               0  NO        1  YES

Bit08   Act. current r0068 >  P2170           0  NO        1  YES
Bit09   Act. unfilt. Vdc   <  P2172           0  NO        1  YES
Bit10   Act. unfilt. Vdc   >  P2172           0  NO        1  YES
Bit11   Load missing                          0  NO        1  YES
```

r2198	**CO/BO: Monitoring word 2**		**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**2**
	P-Group: ALARMS			**Max:** -	

Monitoring word 2 which indicates the state of monitor functions. Each bit represents one monitor function.

Bitfields:

```
Bit00   |f_act| <= P2157 (f_2)                0  NO        1  YES
Bit01   |f_act| >  P2157 (f_2)                0  NO        1  YES
Bit02   |f_act| <= P2159 (f_3)                0  NO        1  YES
Bit03   |f_act| >  P2159 (f_3)                0  NO        1  YES

Bit04   |f_set| <  P2161 (f_min_set)          0  NO        1  YES
Bit05   f_set > 0                             0  NO        1  YES
Bit06   Motor blocked                         0  NO        1  YES
Bit07   Motor pulled out                      0  NO        1  YES

Bit08   | I_act r0068 | >  P2170              0  NO        1  YES
Bit09   | m_act | > P2174 & setpoint reached  0  NO        1  YES
Bit10   | m_act | > P2174                     0  NO        1  YES
Bit11   Belt failure warning                  0  NO        1  YES
Bit12   Belt failure trip                     0  NO        1  YES
```

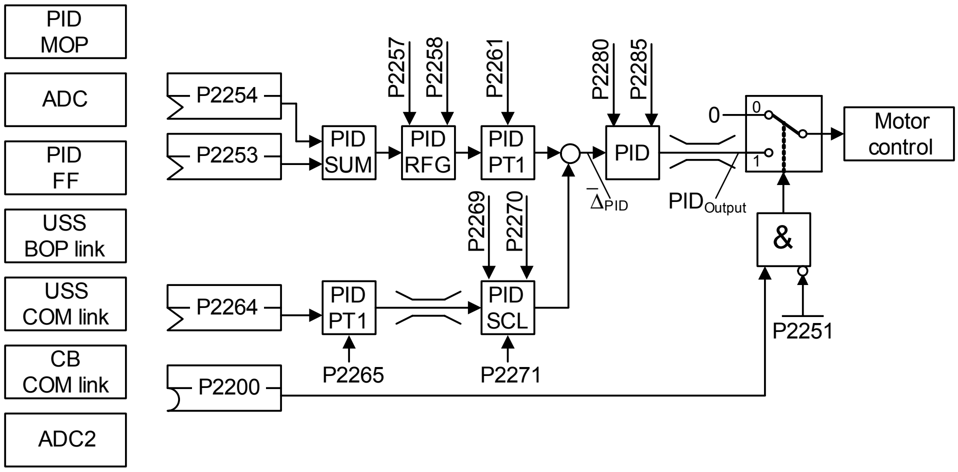
3.37 Technology controller (PID controller)

P2200[3] **BI: Enable PID controller**
CStat: CUT **Datatype:** U32 **Unit:** - **Min:** 0:0 Level **2**
P-Group: TECH **Active:** first confirm **QuickComm.:** No **Def:** 0:0 **Max:** 4000:0

Allows user to enable/disable the PID controller.

P2200 settings:

0 : PID controller de-activated
1 : PID controller permanently activated
BICO parameters : PID controller event-controlled, de-activated/activated



Index:

P2200[0] : 1st. Command data set (CDS)
P2200[1] : 2nd. Command data set (CDS)
P2200[2] : 3rd. Command data set (CDS)

Common Settings:

Parameter	Parameter text	Setting	Meaning
P2200	BI: Enable PID controller	0	PID controller de-activated
		1.0	PID controller always active
		722.x	Digital input x
		BICO	BICO parameter
P2251	PID mode	0	PID as setpoint
P2253	CI: PID setpoint	2224	Fixed PID setpoint (PID-FF)
		2250	PID-MOP
		755.0	Analog input 1
		2015.1	USS on BOP link
		2019.1	USS on COM link
		2050.1	CB on COM link
P2264	CI: PID feedback	755.0	Analog input 1
		755.1	Analog input 2

Dependency:

Setting 1 automatically disables normal ramp times set in P1120 and P1121 and the normal frequency setpoints.

Following an OFF1 or OFF3 command, however, the inverter frequency will ramp down to zero using the ramp time set in P1121 (P1135 for OFF3).

Note:

The PID setpoint source is selected using P2253. The PID setpoint and the PID feedback signal are interpreted as [%] values (not [Hz]). The output of the PID controller is displayed as [%] and then normalized into [Hz] through P2000 (reference frequency) when PID is enabled.

In level 3, the PID controller source enable can also come from the digital inputs in settings 722.0 to 722.5 for DIN1 to DIN6 or from any other BiCo source.

The minimum and maximum motor frequencies (P1080 and P1082) as well as the skip frequencies (P1091 to P1094) remain active on the inverter output. However, enabling skip frequencies with PID control can produce instabilities.

P2201[3]	**Fixed PID setpoint 1**			**Min:**	-200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	0.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	200.00	

Defines Fixed PID Setpoint 1

There are three options available for selection of the PID fixed setpoints:
1. Direct selection
2. Direct selection + ON command
3. Binary coded selection + ON command

1. Direct selection (P0701 - P0706 = 15):
   - In this mode of operation, 1 digital input selects one PID fixed setpoint.
   - If several inputs are active together, the selected setpoints are summed.
   - E.g.: PID-FF1 + PID-FF2 + PID-FF3 + PID-FF4 + PID-FF5 + PID-FF6.

2. Direct selection + ON command (P0701 - P0706 = 16):
   - In this mode of operation the PID fixed setpoints are combined with an ON command.
   - Description as for 1), except that this type of selection issues an ON command concurrent with any setpoint selection.
   - If several inputs are active together, the selected setpoints are summed.
   - E.g.: PID-FF1 + PID-FF2 + PID-FF3 + PID-FF4 + PID-FF5 + PID-FF6.

3. Binary coded selection + ON command (P0701 - P0706 = 17):
   - Using this method to select the fixed PID setpoint (FF-PID) allows you to choose up to 16 different PID setpoints.
   - The setpoints are selected according to the following table:

Index:

P2201[0] : 1st. Drive data set (DDS)
P2201[1] : 2nd. Drive data set (DDS)
P2201[2] : 3rd. Drive data set (DDS)

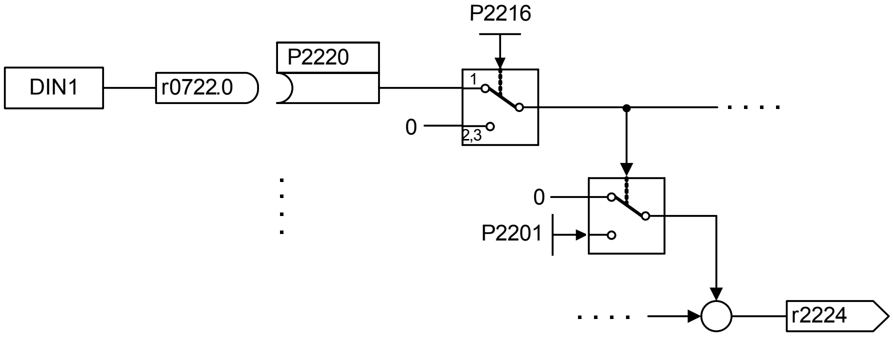
Example:

Binary coded selection :

		DIN4	**DIN3**	**DIN2**	**DIN1**
0 %	PID - FF0	0	0	0	0
P1001	PID - FF1	0	0	0	**1**
P1002	PID - FF2	0	0	**1**	0
P1003	PID - FF3	0	0	**1**	**1**
P1004	PID - FF4	0	**1**	0	0
P1005	PID - FF5	0	**1**	0	**1**
P1006	PID - FF6	0	**1**	**1**	0
P1007	PID - FF7	0	**1**	**1**	**1**
P1008	PID - FF8	**1**	0	0	0
P1009	PID - FF9	**1**	0	0	**1**
P1010	PID - FF10	**1**	0	**1**	0
P1011	PID - FF11	**1**	0	**1**	**1**
P1012	PID - FF12	**1**	**1**	0	0
P1013	PID - FF13	**1**	**1**	0	**1**
P1014	PID - FF14	**1**	**1**	**1**	0
P1015	PID - FF15	**1**	**1**	**1**	**1**

Direct selection of PID-FF1 P2201 via DIN 1:

P0701 = 15
or
P0701 = 99, P2220 = 722.0, P2216 = 1



Dependency:

P2200 = 1 required in user access level 2 to enable setpoint source.

Note:

You may mix different types of frequencies; however, remember that they will be summed if selected together.

P2201 = 100 % corresponds to 4000 hex

P2202[3]	**Fixed PID setpoint 2**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 10.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.00	

Defines Fixed PID Setpoint 2

Index:

P2202[0] : 1st. Drive data set (DDS)
P2202[1] : 2nd. Drive data set (DDS)
P2202[2] : 3rd. Drive data set (DDS)

Details:

See P2201 (Fixed PID Setpoint 1).

P2203[3]	**Fixed PID setpoint 3**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 20.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.00	

Defines Fixed PID Setpoint 3

Index:

P2203[0] : 1st. Drive data set (DDS)
P2203[1] : 2nd. Drive data set (DDS)
P2203[2] : 3rd. Drive data set (DDS)

Details:

See P2201 fixed PID setpoint 1 (FF-PID 1).

P2204[3]	**Fixed PID setpoint 4**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 30.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.00	

Defines Fixed PID Setpoint 4

Index:

P2204[0] : 1st. Drive data set (DDS)
P2204[1] : 2nd. Drive data set (DDS)
P2204[2] : 3rd. Drive data set (DDS)

Details:

See P2201 (Fixed PID Setpoint 1).

P2205[3]	**Fixed PID setpoint 5**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 40.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.00	

Defines Fixed PID Setpoint 5

Index:

P2205[0] : 1st. Drive data set (DDS)
P2205[1] : 2nd. Drive data set (DDS)
P2205[2] : 3rd. Drive data set (DDS)

Details:

See P2201 (Fixed PID Setpoint 1).

P2206[3]	**Fixed PID setpoint 6**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 50.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.00	

Defines Fixed PID Setpoint 6

Index:

P2206[0] : 1st. Drive data set (DDS)
P2206[1] : 2nd. Drive data set (DDS)
P2206[2] : 3rd. Drive data set (DDS)

Details:

See P2201 (Fixed PID Setpoint 1).

P2207[3]	**Fixed PID setpoint 7**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 60.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.00	

Defines Fixed PID Setpoint 7

Index:

P2207[0] : 1st. Drive data set (DDS)
P2207[1] : 2nd. Drive data set (DDS)
P2207[2] : 3rd. Drive data set (DDS)

Details:

See P2201 (Fixed PID Setpoint 1).

P2208[3]	**Fixed PID setpoint 8**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 70.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.00	

Defines Fixed PID Setpoint 8

Index:

P2208[0] : 1st. Drive data set (DDS)
P2208[1] : 2nd. Drive data set (DDS)
P2208[2] : 3rd. Drive data set (DDS)

Details:

See P2201 (Fixed PID Setpoint 1).

P2209[3]	**Fixed PID setpoint 9**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 80.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.00	

Defines Fixed PID Setpoint 9

Index:

P2209[0] : 1st. Drive data set (DDS)
P2209[1] : 2nd. Drive data set (DDS)
P2209[2] : 3rd. Drive data set (DDS)

Details:

See P2201 (Fixed PID Setpoint 1).

P2210[3]	**Fixed PID setpoint 10**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 90.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.00	

Defines Fixed PID Setpoint 10

Index:

P2210[0] : 1st. Drive data set (DDS)
P2210[1] : 2nd. Drive data set (DDS)
P2210[2] : 3rd. Drive data set (DDS)

Details:

See P2201 (Fixed PID Setpoint 1).

P2211[3]	**Fixed PID setpoint 11**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 100.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.00	

Defines Fixed PID Setpoint 11

Index:

P2211[0] : 1st. Drive data set (DDS)
P2211[1] : 2nd. Drive data set (DDS)
P2211[2] : 3rd. Drive data set (DDS)

Details:

See P2201 (Fixed PID Setpoint 1).

P2212[3]	**Fixed PID setpoint 12**			**Min:**	-200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	110.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	200.00	

Defines Fixed PID Setpoint 12

Index:
P2212[0] : 1st. Drive data set (DDS)
P2212[1] : 2nd. Drive data set (DDS)
P2212[2] : 3rd. Drive data set (DDS)

Details:
See P2201 (Fixed PID Setpoint 1).

P2213[3]	**Fixed PID setpoint 13**			**Min:**	-200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	120.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	200.00	

Defines Fixed PID Setpoint 13

Index:
P2213[0] : 1st. Drive data set (DDS)
P2213[1] : 2nd. Drive data set (DDS)
P2213[2] : 3rd. Drive data set (DDS)

Details:
See P2201 (Fixed PID Setpoint 1).

P2214[3]	**Fixed PID setpoint 14**			**Min:**	-200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	130.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	200.00	

Defines Fixed PID Setpoint 14

Index:
P2214[0] : 1st. Drive data set (DDS)
P2214[1] : 2nd. Drive data set (DDS)
P2214[2] : 3rd. Drive data set (DDS)

Details:
See P2201 (Fixed PID Setpoint 1).

P2215[3]	**Fixed PID setpoint 15**			**Min:**	-200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	130.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	200.00	

Defines Fixed PID Setpoint 15

Index:
P2215[0] : 1st. Drive data set (DDS)
P2215[1] : 2nd. Drive data set (DDS)
P2215[2] : 3rd. Drive data set (DDS)

Details:
See P2201 (Fixed PID Setpoint 1).

P2216[3]	**Fixed PID setpoint mode - Bit 0**			**Min:**	1	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:**	1	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:**	3	

Fixed frequencies for PID setpoint can be selected in three different modes. Parameter P2216 defines the mode of selection Bit 0.

Possible Settings:
1 Direct selection
2 Direct selection + ON command
3 Binary coded selection + ON command

Index:
P2216[0] : 1st. Command data set (CDS)
P2216[1] : 2nd. Command data set (CDS)
P2216[2] : 3rd. Command data set (CDS)

P2217[3]	**Fixed PID setpoint mode - Bit 1**			**Min:**	1	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:**	1	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:**	3	

BCD or direct selection Bit 1 for PID setpoint.

Possible Settings:
1 Direct selection
2 Direct selection + ON command
3 Binary coded selection + ON command

Index:
P2217[0] : 1st. Command data set (CDS)
P2217[1] : 2nd. Command data set (CDS)
P2217[2] : 3rd. Command data set (CDS)

P2218[3]	Fixed PID setpoint mode - Bit 2			Min: 1	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 1	3
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 3	

BCD or direct selection Bit 2 for PID setpoint.

Possible Settings:

1 Direct selection
2 Direct selection + ON command
3 Binary coded selection + ON command

Index:

P2218[0] : 1st. Command data set (CDS)
P2218[1] : 2nd. Command data set (CDS)
P2218[2] : 3rd. Command data set (CDS)

P2219[3]	Fixed PID setpoint mode - Bit 3			Min: 1	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 1	3
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 3	

BCD or direct selection Bit 3 for PID setpoint.

Possible Settings:

1 Direct selection
2 Direct selection + ON command
3 Binary coded selection + ON command

Index:

P2219[0] : 1st. Command data set (CDS)
P2219[1] : 2nd. Command data set (CDS)
P2219[2] : 3rd. Command data set (CDS)

P2220[3]	BI: Fixed PID setp. select Bit 0			Min: 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	3
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines command source of fixed PID setpoint selection Bit 0

Index:

P2220[0] : 1st. Command data set (CDS)
P2220[1] : 2nd. Command data set (CDS)
P2220[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)

P2221[3]	BI: Fixed PID setp. select Bit 1			Min: 0:0	Level
	CStat: CT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	3
	P-Group: COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines command source of fixed PID setpoint selection Bit 1.

Index:

P2221[0] : 1st. Command data set (CDS)
P2221[1] : 2nd. Command data set (CDS)
P2221[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)

P2222[3]	**BI: Fixed PID setp. select Bit 2**					Min:	0:0	Level 3
	CStat:	CT	**Datatype:** U32	**Unit:** -		**Def:**	0:0	
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No		**Max:**	4000:0	

Defines command source of fixed PID setpoint selection Bit 2

Index:

P2222[0] : 1st. Command data set (CDS)
P2222[1] : 2nd. Command data set (CDS)
P2222[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)

P2223[3]	**BI: Fixed PID setp. select Bit 3**					Min:	0:0	Level 3
	CStat:	CT	**Datatype:** U32	**Unit:** -		**Def:**	722:3	
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No		**Max:**	4000:0	

Defines command source of fixed PID setpoint selection Bit 3

Index:

P2223[0] : 1st. Command data set (CDS)
P2223[1] : 2nd. Command data set (CDS)
P2223[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)

r2224	**CO: Act. fixed PID setpoint**				Min:	-	Level 2
			Datatype: Float	**Unit:** %	**Def:**	-	
	P-Group:	TECH			**Max:**	-	

Displays total output of PID fixed setpoint selection.

Note:

r2224 = 100 % corresponds to 4000 hex

P2225[3]	**Fixed PID setpoint mode - Bit 4**					Min:	1	Level 3
	CStat:	CT	**Datatype:** U16	**Unit:** -		**Def:**	1	
	P-Group:	TECH	**Active:** first confirm	**QuickComm.:** No		**Max:**	2	

Direct selection or direct selection + ON Bit 4 for PID setpoint.

Possible Settings:

1 Direct selection
2 Direct selection + ON command

Index:

P2225[0] : 1st. Command data set (CDS)
P2225[1] : 2nd. Command data set (CDS)
P2225[2] : 3rd. Command data set (CDS)

P2226[3]	**BI: Fixed PID setp. select Bit 4**					Min:	0:0	Level 3
	CStat:	CT	**Datatype:** U32	**Unit:** -		**Def:**	722:4	
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No		**Max:**	4000:0	

Defines command source of fixed PID setpoint selection Bit 4

Index:

P2226[0] : 1st. Command data set (CDS)
P2226[1] : 2nd. Command data set (CDS)
P2226[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)

P2227[3]	**Fixed PID setpoint mode - Bit 5**				**Min:**	1	Level
	CStat:	CT	**Datatype:** U16	**Unit:** -	**Def:**	1	**3**
	P-Group:	TECH	**Active:** first confirm	**QuickComm.:** No	**Max:**	2	

Direct selection / direct selection + ON Bit 5 for PID setpoint.

Possible Settings:

1 Direct selection
2 Direct selection + ON command

Index:

P2227[0] : 1st. Command data set (CDS)
P2227[1] : 2nd. Command data set (CDS)
P2227[2] : 3rd. Command data set (CDS)

P2228[3]	**BI: Fixed PID setp. select Bit 5**				**Min:**	0:0	Level
	CStat:	CT	**Datatype:** U32	**Unit:** -	**Def:**	722:5	**3**
	P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Max:**	4000:0	

Defines command source of fixed PID setpoint selection Bit 5

Index:

P2228[0] : 1st. Command data set (CDS)
P2228[1] : 2nd. Command data set (CDS)
P2228[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)

P2231[3]	**Setpoint memory of PID-MOP**				**Min:**	0	Level
	CStat:	CUT	**Datatype:** U16	**Unit:** -	**Def:**	0	**2**
	P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	1	

Setpoint memory

Possible Settings:

0 PID-MOP setpoint will not be stored
1 PID-MOP setpoint will be stored (P2240 is updated)

Index:

P2231[0] : 1st. Drive data set (DDS)
P2231[1] : 2nd. Drive data set (DDS)
P2231[2] : 3rd. Drive data set (DDS)

Dependency:

If 0 selected, setpoint returns to value set in P2240 (setpoint of PID-MOP) after an OFF command.

If 1 is selected, active setpoint is "remembered" and P2240 updated with current value.

Details:

See P2240 (setpoint of PID-MOP)

P2232	**Inhibit neg. PID-MOP setpoints**				**Min:**	0	Level
	CStat:	CT	**Datatype:** U16	**Unit:** -	**Def:**	1	**2**
	P-Group:	TECH	**Active:** first confirm	**QuickComm.:** No	**Max:**	1	

This parameter suppresses negative setpoints of the PID-MOP output r2250.

Possible Settings:

0 Neg. PID-MOP setpoint is allowed
1 Neg. PID-MOP setpoint inhibited

Note:

Setting 0 enables a change of motor direction using the motor potentiometer setpoint (increase/decrease frequency either by using digital inputs or motor potentiometer up/down buttons.

P2235[3] BI: Enable PID-MOP (UP-cmd)

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0	Level
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	19:13	**3**
				Max:	4000:0	

Defines source of UP command.

Index:

P2235[0] : 1st. Command data set (CDS)
P2235[1] : 2nd. Command data set (CDS)
P2235[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
19.D = Keypad UP button

Dependency:

To change setpoint:

1. Use UP / DOWN key on BOP or
2. Set P0702/P0703 = 13/14 (function of digital inputs 2 and 3)

P2236[3] BI: Enable PID-MOP (DOWN-cmd)

CStat:	CT	**Datatype:** U32	**Unit:** -	**Min:**	0:0	Level
P-Group:	COMMANDS	**Active:** first confirm	**QuickComm.:** No	**Def:**	19:14	**3**
				Max:	4000:0	

Defines source of DOWN command.

Index:

P2236[0] : 1st. Command data set (CDS)
P2236[1] : 2nd. Command data set (CDS)
P2236[2] : 3rd. Command data set (CDS)

Common Settings:

722.0 = Digital input 1 (requires P0701 to be set to 99, BICO)
722.1 = Digital input 2 (requires P0702 to be set to 99, BICO)
722.2 = Digital input 3 (requires P0703 to be set to 99, BICO)
722.3 = Digital input 4 (requires P0704 to be set to 99, BICO)
722.4 = Digital input 5 (requires P0705 to be set to 99, BICO)
722.5 = Digital input 6 (requires P0706 to be set to 99, BICO)
722.6 = Digital input 7 (via analog input 1, requires P0707 to be set to 99)
722.7 = Digital input 8 (via analog input 2, requires P0708 to be set to 99)
19.E = Keypad DOWN button

Dependency:

To change setpoint:

1. Use UP / DOWN key on BOP or
2. Set P0702/P0703 = 13/14 (function of digital inputs 2 and 3)

P2240[3] Setpoint of PID-MOP

CStat:	CUT	**Datatype:** Float	**Unit:** %	**Min:**	-200.00	Level
P-Group:	TECH	**Active:** Immediately	**QuickComm.:** No	**Def:**	10.00	**2**
				Max:	200.00	

Setpoint of the motor potentiometer.

Allows user to set a digital PID setpoint in [%].

Index:

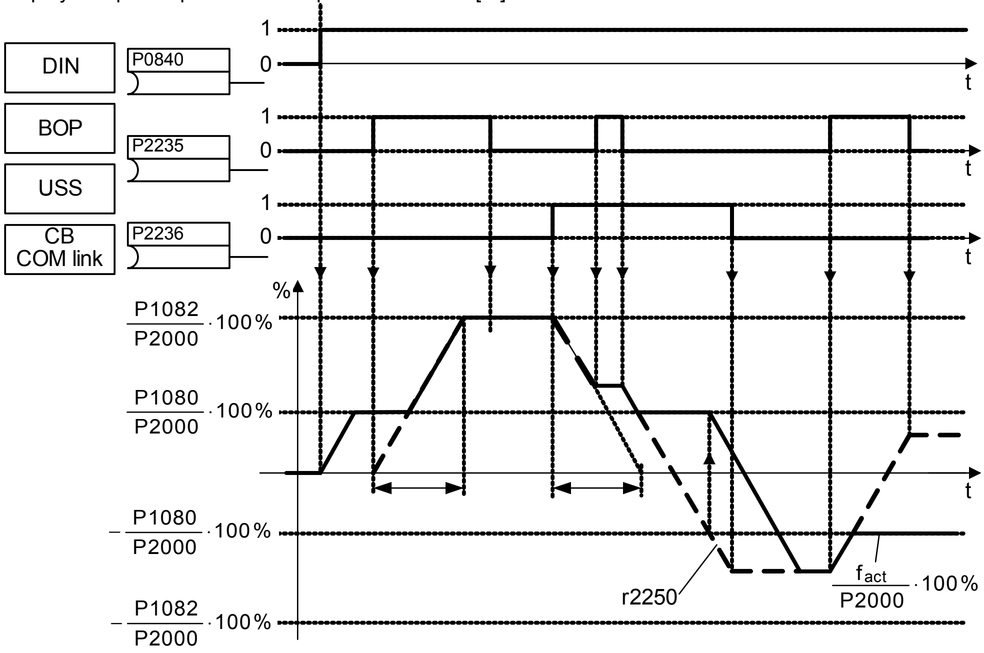
P2240[0] : 1st. Drive data set (DDS)
P2240[1] : 2nd. Drive data set (DDS)
P2240[2] : 3rd. Drive data set (DDS)

Note:

P2240 = 100 % corresponds to 4000 hex

r2250	**CO: Output setpoint of PID-MOP**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**2**
	P-Group: TECH			**Max:** -	

Displays output setpoint of motor potentiometer in [%].



Note:

r2250 = 100 % corresponds to 4000 hex

P2251	**PID mode**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 1	

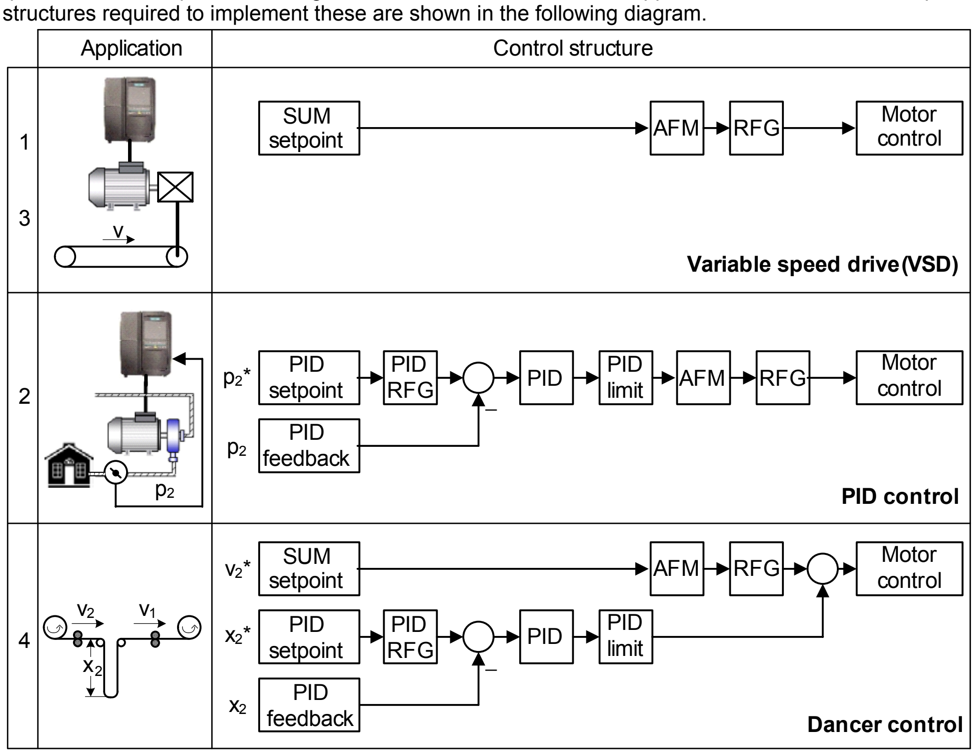
Configuration of PID controller.

Possible Settings:

0 PID as setpoint
1 PID as trim

Common Settings:

In addition to the open-loop/closed-loop control of a three-phase motor (standard applications for a drive inverter), MICROMASTER has a technological controller that can be used to control (closed-loop) process quantities such as pressure, filling level or control a winder. These applications and the closed-loop control structures required to implement these are shown in the following diagram.

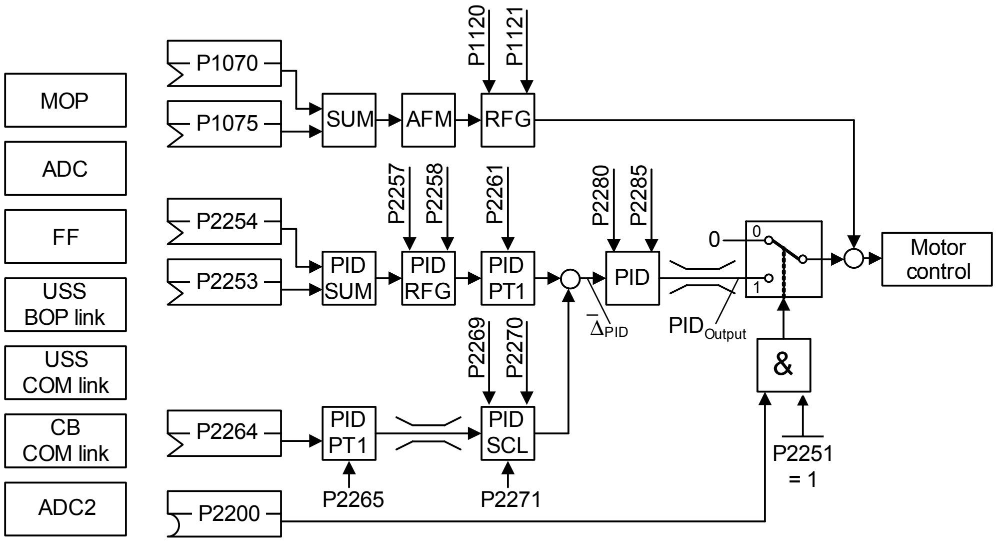


These structures are selected using parameters P2200 and P2251 (refer to the following table).

		Setpoint via SUM	Setpoint via PID controller	RFG	PID-RFG
1	**P2200 = 0:0** [2)] **P2251 = 0**	VSD	—	ON: active OFF1/3: active	ON: - OFF1/3: -
2	**P2200 = 1:0** [2)] **P2251 = 0**	—	PID control	ON: - OFF1/3: active	ON: active OFF1/3: -
3	**P2200 = 0:0** [1)] **P2251 = 1**	VSD	—	ON: active OFF1/3: active	ON: - OFF1/3: -
4	**P2200 = 1:0** [1)] **P2251 = 1**	Dancer control		ON: active OFF1/3: active	ON: active OFF1/3: active

1) will take change with drive running
2) change only taken when drive stopped

Closed-loop dancer roll control is selected with P2251 = P2200 = 1. Important parameters and the structure are shown in the following diagrams.



Parameter	Parameter text	Setting	Meaning
P1070	CI: Main setpoint	1024	Fixed setpoint (FF)
		1050	MOP
		755.0	Analog input 1
		2015.1	USS on BOP link
		2019.1	USS on COM link
		2050.1	CB on COM link
P2200	BI: Enable PID controller	0	PID controller de-activated
		1.0	PID controller always active
		722.x	Digital input x
		BICO	BICO parameter
P2251	PID mode	1	PID as trim
P2253	CI: PID setpoint	1024	Fixed setpoint (FF)
		1050	MOP
		755.0	Analog input 1
		2015.1	USS on BOP link
		2019.1	USS on COM link
		2050.1	CB on COM link
P2264	CI: PID feedback	755.0	Analog input 1
		755.1	Analog input 2

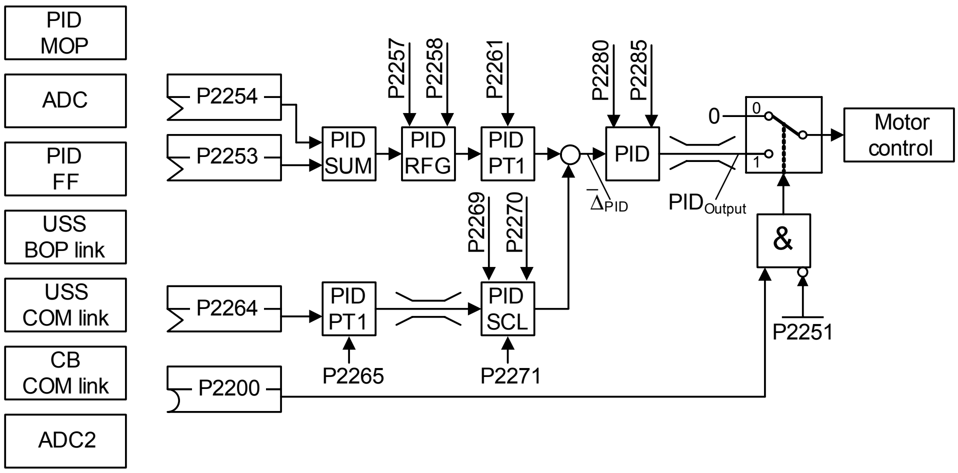
Dependency:

Active when PID loop is enabled (see P2200).

P2253[3] CI: PID setpoint

CStat: CUT	Datatype: U32	Unit: -	Min: 0:0 / Def: 0:0 / Max: 4000:0
P-Group: TECH	Active: first confirm	QuickComm.: No	Level 2

Defines setpoint source for PID setpoint input.



Index:

P2253[0] : 1st. Command data set (CDS)
P2253[1] : 2nd. Command data set (CDS)
P2253[2] : 3rd. Command data set (CDS)

Common Settings:

Parameter	Parameter text	Setting	Meaning
P2200	BI: Enable PID controller	0	PID controller de-activated
		1.0	PID controller always active
		722.x	Digital input x
		BICO	BICO parameter
P2251	PID mode	0	PID as setpoint
P2253	CI: PID setpoint	2224	Fixed PID setpoint (PID-FF)
		2250	PID-MOP
		755.0	Analog input 1
		2015.1	USS on BOP link
		2019.1	USS on COM link
		2050.1	CB on COM link
P2264	CI: PID feedback	755.0	Analog input 1
		755.1	Analog input 2

P2254[3] CI: PID trim source

CStat: CUT	Datatype: U32	Unit: -	Min: 0:0 / Def: 0:0 / Max: 4000:0
P-Group: TECH	Active: first confirm	QuickComm.: No	Level 3

Selects trim source for PID setpoint. This signal is multiplied by the trim gain and added to the PID setpoint.

Index:

P2254[0] : 1st. Command data set (CDS)
P2254[1] : 2nd. Command data set (CDS)
P2254[2] : 3rd. Command data set (CDS)

Common Settings:

See parameter P2253

P2255 PID setpoint gain factor

CStat: CUT	Datatype: Float	Unit: -	Min: 0.00 / Def: 100.00 / Max: 100.00
P-Group: TECH	Active: Immediately	QuickComm.: No	Level 3

Gain factor for PID setpoint. The PID setpoint input is multiplied by this gain factor to produce a suitable ratio between setpoint and trim.

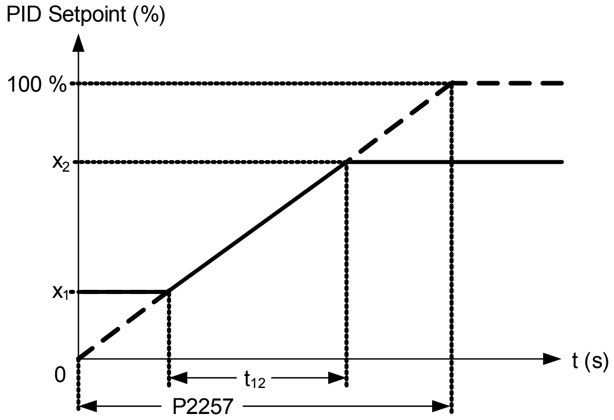
P2256 PID trim gain factor

CStat: CUT	Datatype: Float	Unit: -	Min: 0.00 / Def: 100.00 / Max: 100.00
P-Group: TECH	Active: Immediately	QuickComm.: No	Level 3

Gain factor for PID trim. This gain factor scales the trim signal, which is added to the main PID setpoint.

P2257	**Ramp-up time for PID setpoint**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 1.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

Sets the ramp-up time for the PID setpoint.



$$t_{12} = \frac{|x_2 - x_1|}{100\%} \cdot P2257$$

Dependency:

P2200 = 1 (PID control is enabled) disables normal ramp-up time (P1120).

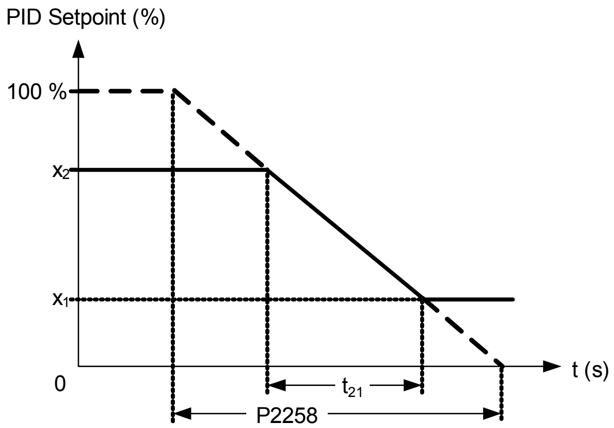
PID ramp time effective only on PID setpoint and only active
- when PID setpoint is changed or
- when RUN command is given.

Notice:

Setting the ramp-up time too short may cause the inverter to trip, on overcurrent for example.

P2258	**Ramp-down time for PID setpoint**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 1.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 650.00	

Sets ramp-down time for PID setpoint.



$$t_{21} = \frac{|x_1 - x_2|}{100\%} \cdot P2258$$

Dependency:
- P2200 = 1 (PID control is enabled) disables normal ramp-up time (P1120).
- PID setpoint ramp effective only on PID setpoint changes.
- P1121 (ramp-down time) and P1135 (OFF3 ramp-down time) define the ramp times used after OFF1 and OFF3 respectively.

Notice:

Setting the ramp-down time too short can cause the inverter to trip on overvoltage (F0002) / overcurrent (F0001).

r2260	**CO: PID setpoint after PID-RFG**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**2**
	P-Group: TECH			**Max:** -	

Displays total active PID setpoint after PID-RFG in [%].

Note:

r2260 = 100 % corresponds to 4000 hex

P2261	**PID setpoint filter timeconstant**		**Min:** 0.00		Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 0.00	**3**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 60.00	

Sets a time constant for smoothing the PID setpoint.

Note:

0 = no smoothing

r2262	**CO: Filtered PID setp. after RFG**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays the filtered PID setpoint after the PID ramp-function generator (PID_HLG) as percentage. Parameter r2262 is obtained from the filtered parameter r2260 that is filtered using the PT1 filter with time constant P2261.

Note:

r2262 = 100 % corresponds to 4000 hex

P2263	**PID controller type**			**Min:** 0	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 1	

Sets the PID controller type.

Possible Settings:

0 D component on feedback signal
1 D component on error signal

P2264[3]	**CI: PID feedback**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 755:0	**2**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Selects the source of the PID feedback signal.

Index:

P2264[0] : 1st. Command data set (CDS)
P2264[1] : 2nd. Command data set (CDS)
P2264[2] : 3rd. Command data set (CDS)

Common Settings:

Parameter	Parameter text	Setting	Meaning
P2200	BI: Enable PID controller	0	PID controller de-activated
		1.0	PID controller always active
		722.x	Digital input x
		BICO	BICO parameter
P2251	PID mode	0	PID as setpoint
P2253	CI: PID setpoint	2224	Fixed PID setpoint (PID-FF)
		2250	PID-MOP
		755.0	Analog input 1
		2015.1	USS on BOP link
		2019.1	USS on COM link
		2050.1	CB on COM link
P2264	CI: PID feedback	755.0	Analog input 1
		755.1	Analog input 2

Note:

When analog input is selected, offset and gain can be implemented using parameters P0756 to P0760 (ADC scaling).

P2265	**PID feedback filter timeconstant**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 0.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 60.00	

Defines time constant for PID feedback filter.

r2266	**CO: PID filtered feedback**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**2**
	P-Group: TECH			**Max:** -	

Displays PID feedback signal in [%].

Note:

r2266 = 100 % corresponds to 4000 hex

P2267	**Max. value for PID feedback**			**Min:**	-200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	100.00	**3**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	200.00	

Sets the upper limit for the value of the feedback signal in [%].

Note:

- P2267 = 100 % corresponds to 4000 hex
- When PID is enabled (P2200 = 1) and the signal rises above this value, the inverter will trip with F0222 .

P2268	**Min. value for PID feedback**			**Min:**	-200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	0.00	**3**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	200.00	

Sets lower limit for value of feedback signal in [%].

Note:

- P2268 = 100 % corresponds to 4000 hex
- When PID is enabled (P2200 = 1) and the signal rises below this value, the inverter will trip with F0221.

P2269	**Gain applied to PID feedback**			**Min:**	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:**	100.00	**3**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	500.00	

Allows the user to scale the PID feedback as a percentage value [%].

A gain of 100.0 % means that feedback signal has not changed from its default value.

P2270	**PID feedback function selector**			**Min:**	0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:**	0	**3**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	3	

Applies mathematical functions to the PID feedback signal, allowing multiplication of the result by P2269 (gain applied to PID feedback).

Possible Settings:

0 Disabled
1 Square root (root(x))
2 Square (x*x)
3 Cube (x*x*x)

P2271	**PID transducer type**			**Min:**	0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:**	0	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	1	

Allows the user to select the transducer type for the PID feedback signal.

Possible Settings:

0 Disabled
1 Inversion of PID feedback signal

Notice:

It is essential that you select the correct tranducer type.

If you are unsure whether 0 or 1 is applicable, you can determine the correct type as follows:

1. Disable the PID function (P2200 = 0).
2. Increase the motor frequency while measuring the feedback signal.
3. If the feedback signal increases with an increase in motor frequency, the PID transducer type should be 0.
4. If the feedback signal decreases with an increase in motor frequency the PID transducer type should be set to 1.

r2272	**CO: PID scaled feedback**			**Min:**	-	Level
		Datatype: Float	**Unit:** %	**Def:**	-	**2**
	P-Group: TECH			**Max:**	-	

Displays PID scaled feedback signal in [%].

Note:

r2272 = 100 % corresponds to 4000 hex

r2273	**CO: PID error**			**Min:**	-	Level
		Datatype: Float	**Unit:** %	**Def:**	-	**2**
	P-Group: TECH			**Max:**	-	

Displays PID error (difference) signal between setpoint and feedback signals in [%].

Note:

r2273 = 100 % corresponds to 4000 hex

P2274	**PID derivative time**				**Min:**	0.000	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s		**Def:**	0.000	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No		**Max:**	60.000	

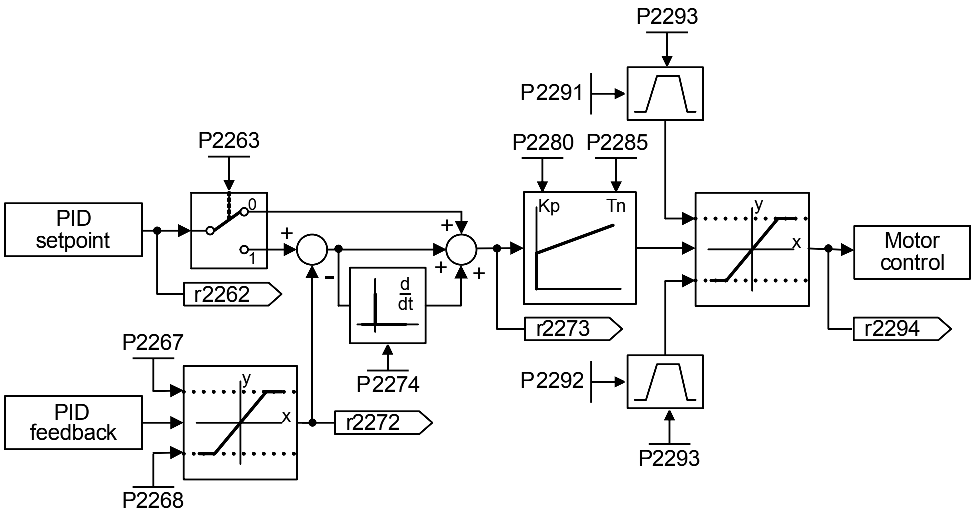
Sets PID derivative time.

P2274 = 0:
The derivative term does not have any effect (it applies a gain of 1).

P2280	**PID proportional gain**				**Min:**	0.000	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -		**Def:**	3.000	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No		**Max:**	65.000	

Allows user to set proportional gain for PID controller.

The PID controller is implemented using the standard model.



For best results, enable both P and I terms.

Dependency:

P2280 = 0 (P term of PID = 0):
I term acts on the square of the error signal.

P2285 = 0 (I term of PID = 0):
PID controller acts as a P or PD controller respectively.

Note:

- If the system is prone to sudden step changes in the feedback signal, P term should normally be set to a small value (0.5) with a faster I term for optimum performance.

- The D term (P2274) multiplies the difference between the present and previous feedback signal thus accelerating the controller reaction to an error that appears suddenly.
- The D term should be used carefully, since it can cause the controller output to fluctuate as every change in the feedback signal is amplified by the controller derivative action.

P2285	**PID integral time**				**Min:**	0.000	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s		**Def:**	0.000	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No		**Max:**	60.000	

Sets integral time constant for PID controller.

Details:

See P2280 (PID proportional gain).

P2291	**PID output upper limit**				**Min:**	-200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %		**Def:**	100.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No		**Max:**	200.00	

Sets upper limit for PID controller output in [%].

Dependency:

If F max (P1082) is greater than P2000 (reference frequency), either P2000 or P2291 (PID output upper limit) must be changed to achieve F max.

Note:

P2291 = 100 % corresponds to 4000 hex (as defined by P2000 (reference frequency)).

P2292	**PID output lower limit**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 0.00	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 200.00	

Sets lower limit for the PID controller output in [%].

Dependency:

A negative value allows bipolar operation of PID controller.

Note:

P2292 = 100 % corresponds to 4000 hex

P2293	**Ramp-up /-down time of PID limit**			**Min:** 0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** s	**Def:** 1.00	**3**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 100.00	

Sets maximum ramp rate on output of PID.

When PI is enabled, the output limits are ramped up from 0 to the limits set in P2291 (PID output upper limit) and P2292 (PID output lower limit). Limits prevent large step changes appearing on the output of the PID when the inverter is started. Once the limits have been reached, the PID controller output is instantaneous.

These ramp times are used whenever a RUN command is issued.

Note:

If an OFF1 or OFF 3 are issued, the inverter output frequency ramps down as set in P1121 (ramp-down time) or P1135 (OFF3 ramp-down time).

r2294	**CO: Act. PID output**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**2**
	P-Group: TECH			**Max:** -	

Displays PID output in [%]

Note:

r2294 = 100 % corresponds to 4000 hex

P2295	**Gain applied to PID output**			**Min:** -100.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 100.00	**3**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 100.00	

Allows the user to scale the PID output as a percentage value [%].

A gain of 100.0 % means that output signal has not changed from its default value.

P2350	**PID autotune enable**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**2**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:** 4	

Enables autotune function of PID controller.

Possible Settings:

0 PID autotuning disabled
1 PID autotuning via Ziegler Nichols (ZN) standard
2 PID autotuning as 1 plus some overshoot (O/S)
3 PID autotuning as 2 little or no overshoot (O/S)
4 PID autotuning PI only, quarter damped response

Dependency:

Active when PID loop is enabled (see P2200).

Note:

P2350 = 1
This is the standard Ziegler Nichols (ZN) tuning which should be a quarter damped response to a step.

P2350 = 2
This tuning will give some overshoot (O/S) but should be faster than option 1

P2350 = 3
This tuning should give little or no overshoot but will not be as fast as option 2.

P2350 = 4
This tuning only changes values of P and I and should be a quarter damped response.

The option to be selected depends on the application but braodly speaking option 1 will give an all round good respsonse, whereas if a faster response is desired option 2 should be selected. If no overshoot is desired then option 3 is the choice. For cases where no D term is wanted then option 4 can be selected. The tuning procedure is the same for all options. It is just the calculation of P,I and D values that is different.

After autotune this parameter is set to zero (autotune completed).

P2354	**PID tuning timeout length**			**Min:**	60	Level
	CStat: CUT	**Datatype:** U16	**Unit:** s	**Def:**	240	**3**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	65000	

This parameter determines the time that the auto tuning code will wait before aborting a tuning run if no oscillation has been obtained.

P2355	**PID tuning offset**			**Min:**	0.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:**	5.00	**3**
	P-Group: TECH	**Active:** Immediately	**QuickComm.:** No	**Max:**	20.00	

Sets applied offset and deviation for PID autotuning.

Note:

This can be varied depending on plant conditions e.g. a very long system time constant might require a larger value.

3.38 Positioning down ramp

P2480[3]	**Position mode**			**Min:**	1	Level
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:**	1	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:**	1	

Sets the mode for positioning mode.

Possible Settings:

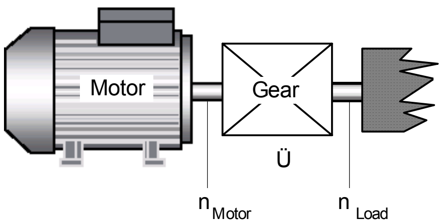
1 Open loop positioning

Index:

P2480[0] : 1st. Drive data set (DDS)
P2480[1] : 2nd. Drive data set (DDS)
P2480[2] : 3rd. Drive data set (DDS)

P2481[3]	**Gearbox ratio input**			**Min:**	0.01	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:**	1.00	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:**	9999.99	

Defines the ratio between number of motor shaft revolutions to equal one revolution of the gearbox output shaft.



$$Ü = \frac{\text{Motor revolutions}}{\text{Load revolutions}} = \frac{P2481}{P2482}$$

Index:

P2481[0] : 1st. Drive data set (DDS)
P2481[1] : 2nd. Drive data set (DDS)
P2481[2] : 3rd. Drive data set (DDS)

P2482[3]	**Gearbox ratio output**			**Min:**	0.01	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:**	1.00	**3**
	P-Group: CONTROL	**Active:** first confirm	**QuickComm.:** No	**Max:**	9999.99	

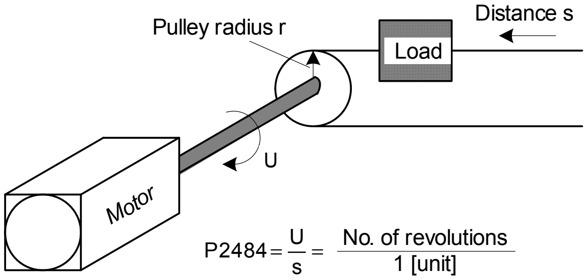
Defines the ratio between number of motor shaft revolutions to equal one revolution of the gearbox output shaft.

Index:

P2482[0] : 1st. Drive data set (DDS)
P2482[1] : 2nd. Drive data set (DDS)
P2482[2] : 3rd. Drive data set (DDS)

P2484[3]	No. of shaft turns = 1 Unit			Min: 0.01	Level
	CStat: CUT	Datatype: Float	Unit: -	Def: 1.00	3
	P-Group: CONTROL	Active: first confirm	QuickComm.: No	Max: 9999.99	

Sets the number of rotations of the motor shaft required to represent 1 unit of user selected units.



The following equation determines the number of motor shaft revolutions to stop:

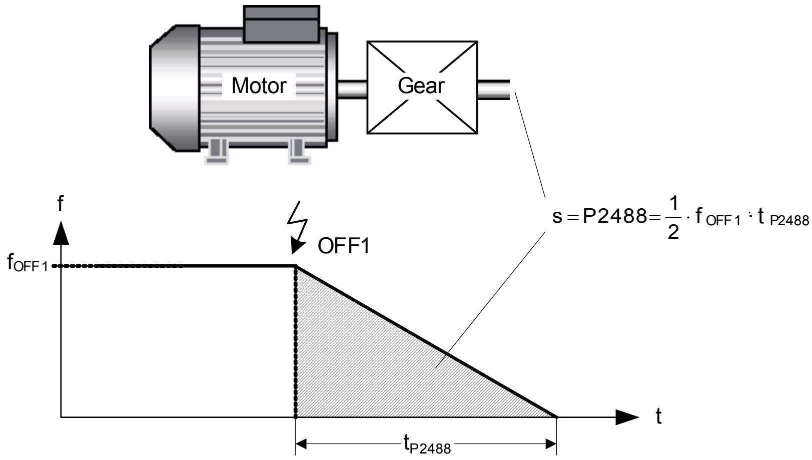
$$\text{Revolutions}_{\text{Motor}} = P2488 \cdot P2484 \cdot \frac{P2481}{P2482}$$

Index:

P2484[0] : 1st. Drive data set (DDS)
P2484[1] : 2nd. Drive data set (DDS)
P2484[2] : 3rd. Drive data set (DDS)

P2488[3]	Distance / No. of revolutions			Min: 0.01	Level
	CStat: CUT	Datatype: Float	Unit: -	Def: 1.00	3
	P-Group: CONTROL	Active: first confirm	QuickComm.: No	Max: 9999.99	

Sets the required distance or number of revolutions (see P2484).



Index:

P2488[0] : 1st. Drive data set (DDS)
P2488[1] : 2nd. Drive data set (DDS)
P2488[2] : 3rd. Drive data set (DDS)

r2489	Act. number of shaft revolutions			Min: -	Level
		Datatype: Float	Unit: -	Def: -	3
	P-Group: CONTROL			Max: -	

Displayes the actual number of shaft revolutions since trigger of positioning.

Note:

Positioning ramp down is an open loop control method. So, there might be a difference between the position setpoint and the calculated actual position shown in r2489. That means, it could happen that the setpoint position is already reached, although r2489 displays a different actual position .

3.39 Free function blocks (FFB)

P2800	**Enable FFBs**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 1	

Free function blocks (FFB) are enabled in two steps.
1. Parameter P2800 enables all free function blocks , normally (P2800 = 1).
2. Parameters P2801 and P2802 respectively, enable each free function block individually (P2801[x] > 0 oder P2802[x] > 0).

Possible Settings:

0 Disabled
1 Enabled

Dependency:

All active function blocks will be calculated in every 132 ms.

P2801[17]	**Activate FFBs**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 3	

Free function blocks (FFB) are enabled in two steps.
1. Parameter P2800 enables all free function blocks , normally (P2800 = 1)
2. Parameters P2801 and P2802 respectively, enable each free function block individually (P2801[x] > 0 oder P2802[x] > 0)

In addition, Parameters P2801 and P2802 determine the chronological order of each function block. The following table shows that the priority increases from left to right and from bottom to top.

Priority 2: low ← high
Priority 1: high (top) → low (bottom)

Level 3																															
Level 2																															
Level 1																															
Inactive 0																															
	P2802 [13] CMP 2	P2802 [12] CMP 1	P2802 [11] DIV 2	P2802 [10] DIV 1	P2802 [9] MUL 2	P2802 [8] MUL 1	P2802 [7] SUB 2	P2802 [6] SUB 1	P2802 [5] ADD 2	P2802 [4] ADD 1	P2802 [3] Timer 4	P2802 [2] Timer 3	P2802 [1] Timer 2	P2802 [0] Timer 1	P2801 [16] RS-FF 3	P2801 [15] RS-FF 2	P2801 [14] RS-FF 1	P2801 [13] D-FF 2	P2801 [12] D-FF 1	P2801 [11] NOT 3	P2801 [10] NOT 2	P2801 [9] NOT 1	P2801 [8] XOR 3	P2801 [7] XOR 2	P2801 [6] XOR 1	P2801 [5] OR 3	P2801 [4] OR 2	P2801 [3] OR 1	P2801 [2] AND 3	P2801 [1] AND 2	P2801 [0] AND 1

Possible Settings:

0 Not Active
1 Level 1
2 Level 2
3 Level 3

Index:

P2801[0] : Enable AND 1
P2801[1] : Enable AND 2
P2801[2] : Enable AND 3
P2801[3] : Enable OR 1
P2801[4] : Enable OR 2
P2801[5] : Enable OR 3
P2801[6] : Enable XOR 1
P2801[7] : Enable XOR 2
P2801[8] : Enable XOR 3
P2801[9] : Enable NOT 1
P2801[10] : Enable NOT 2
P2801[11] : Enable NOT 3
P2801[12] : Enable D-FF 1
P2801[13] : Enable D-FF 2
P2801[14] : Enable RS-FF 1
P2801[15] : Enable RS-FF 2
P2801[16] : Enable RS-FF 3

Example:

P2801[3] = 2, P2801[4] = 2, P2802[3] = 3, P2802[4] = 2
FFBs will be calculated in following order:
P2802[3], P2801[3] , P2801[4], P2802[4]

Dependency:

- Set P2800 to 1 to enable function blocks.
- All active function blocks will be calculated in every 132 ms.

P2802[14]	**Activate FFBs**				**Min:** 0	Level
	CStat:	CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group:	TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 3	

Free function blocks (FFB) are enabled in two steps.

1. Parameter P2800 enables all free function blocks , normally (P2800 = 1)
2. Parameters P2801 and P2802 respectively, enable each free function block individually (P2801[x] > 0 oder P2802[x] > 0)

In addition, Parameters P2801 and P2802 determine the chronological order of each function block. The following table shows that the priority increases from left to right and from bottom to top.

Priority 2: low ← high

Priority 1: high ↓ low

	P2802 [13] CMP 2	P2802 [12] CMP 1	P2802 [11] DIV 2	P2802 [10] DIV 1	P2802 [9] MUL 2	P2802 [8] MUL 1	P2802 [7] SUB 2	P2802 [6] SUB 1	P2802 [5] ADD 2	P2802 [4] ADD 1	P2802 [3] Timer 4	P2802 [2] Timer 3	P2802 [1] Timer 2	P2802 [0] Timer 1	P2801 [16] RS-FF 3	P2801 [15] RS-FF 2	P2801 [14] RS-FF 1	P2801 [13] D-FF 2	P2801 [12] D-FF 1	P2801 [11] NOT 3	P2801 [10] NOT 2	P2801 [9] NOT 1	P2801 [8] XOR 3	P2801 [7] XOR 2	P2801 [6] XOR 1	P2801 [5] OR 3	P2801 [4] OR 2	P2801 [3] OR 1	P2801 [2] AND 3	P2801 [1] AND 2	P2801 [0] AND 1
Level 3																															
Level 2																															
Level 1																															
Inactive 0																															

Possible Settings:

0 Not Active
1 Level 1
2 Level 2
3 Level 3

Index:

P2802[0] : Enable timer 1
P2802[1] : Enable timer 2
P2802[2] : Enable timer 3
P2802[3] : Enable timer 4
P2802[4] : Enable ADD 1
P2802[5] : Enable ADD 2
P2802[6] : Enable SUB 1
P2802[7] : Enable SUB 2
P2802[8] : Enable MUL 1
P2802[9] : Enable MUL 2
P2802[10] : Enable DIV 1
P2802[11] : Enable DIV 2
P2802[12] : Enable CMP 1
P2802[13] : Enable CMP 2

Example:

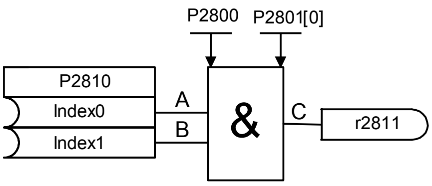
P2801[3] = 2, P2801[4] = 2, P2802[3] = 3, P2802[4] = 2
FFBs will be calculated in following order:
P2802[3], P2801[3] , P2801[4], P2802[4]

Dependency:

- Set P2800 to 1 to enable function blocks.
- All active function blocks will be calculated in every 132 ms.

P2810[2]	**BI: AND 1**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

P2810[0], P2810[1] define inputs of AND 1 element, output is P2811.



A	B	C
0	0	0
0	1	0
1	0	0
1	1	1

Index:
P2810[0] : Binector input 0 (BI 0)
P2810[1] : Binector input 1 (BI 1)

Dependency:
P2801[0] is active level for the AND element.

r2811	**BO: AND 1**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Output of AND 1 element. Displays and logic of bits defined in P2810[0], P2810[1].

Dependency:
P2801[0] is active level for the AND element.

P2812[2]	**BI: AND 2**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

P2812[0], 2812[1] define inputs of AND 2 element, output is P2813.

Index:
P2812[0] : Binector input 0 (BI 0)
P2812[1] : Binector input 1 (BI 1)

Dependency:
P2801[1] is active level for the AND element.

r2813	**BO: AND 2**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Output of AND 2 element. Displays and logic of bits defined in P2812[0], P2812[1].

Dependency:
P2801[1] is active level for the AND element.

P2814[2]	**BI: AND 3**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

P2814[0], P2814[1] define inputs of AND 3 element, output is P2815.

Index:
P2814[0] : Binector input 0 (BI 0)
P2814[1] : Binector input 1 (BI 1)

Dependency:
P2801[2] is active level for the AND element.

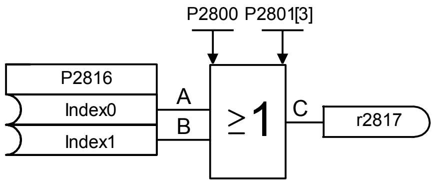
r2815	**BO: AND 3**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Output of AND 3 element. Displays and logic of bits defined in P2814[0], P2814[1].

Dependency:
P2801[2] is active level for the AND element.

P2816[2] **BI: OR 1**
CStat: CUT **Datatype:** U32 **Unit:** - **Min:** 0:0 **Def:** 0:0 **Max:** 4000:0
P-Group: TECH **Active:** first confirm **QuickComm.:** No
Level **3**

P2816[0], P2816[1] define inputs of OR 1 element, output is P2817.



A	B	C
0	0	0
0	1	1
1	0	1
1	1	1

Index:
P2816[0] : Binector input 0 (BI 0)
P2816[1] : Binector input 1 (BI 1)

Dependency:
P2801[3] is active level for the OR element.

r2817 **BO: OR 1**
Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -
P-Group: TECH
Level **3**

Output of OR 1 element. Displays or logic of bits defined in P2816[0], P2816[1].

Dependency:
P2801[3] is active level for the OR element.

P2818[2] **BI: OR 2**
CStat: CUT **Datatype:** U32 **Unit:** - **Min:** 0:0 **Def:** 0:0 **Max:** 4000:0
P-Group: TECH **Active:** first confirm **QuickComm.:** No
Level **3**

P2818[0], P2818[1] define inputs of OR 2 element, output is P2819.

Index:
P2818[0] : Binector input 0 (BI 0)
P2818[1] : Binector input 1 (BI 1)

Dependency:
P2801[4] is active level for the OR element.

r2819 **BO: OR 2**
Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -
P-Group: TECH
Level **3**

Output of OR 2 element. Displays or logic of bits defined in P2818[0], P2818[1].

Dependency:
P2801[4] is active level for the OR element.

P2820[2] **BI: OR 3**
CStat: CUT **Datatype:** U32 **Unit:** - **Min:** 0:0 **Def:** 0:0 **Max:** 4000:0
P-Group: TECH **Active:** first confirm **QuickComm.:** No
Level **3**

P2820[0], P2820[1] define inputs of OR 3 element, output is P2821.

Index:
P2820[0] : Binector input 0 (BI 0)
P2820[1] : Binector input 1 (BI 1)

Dependency:
P2801[5] is active level for the OR element.

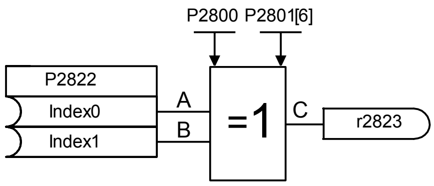
r2821 **BO: OR 3**
Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -
P-Group: TECH
Level **3**

Output of OR 3 element. Displays or logic of bits defined in P2820[0], P2820[1].

Dependency:
P2801[5] is active level for the OR element.

P2822[2]	**BI: XOR 1**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

P2822[0], P2822[1] define inputs of XOR 1 element, output is P2823.



A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

Index:
P2822[0] : Binector input 0 (BI 0)
P2822[1] : Binector input 1 (BI 1)

Dependency:
P2801[6] is active level for the XOR element.

r2823	**BO: XOR 1**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Output of XOR 1 element. Displays exclusive-or logic of bits defined in P2822[0], P2822[1].

Dependency:
P2801[6] is active level for the XOR element.

P2824[2]	**BI: XOR 2**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

P2824[0], P2824[1] define inputs of XOR 2 element, output is P2825.

Index:
P2824[0] : Binector input 0 (BI 0)
P2824[1] : Binector input 1 (BI 1)

Dependency:
P2801[7] is active level for the XOR element.

r2825	**BO: XOR 2**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Output of XOR 2 element. Displays exclusive-or logic of bits defined in P2824[0], P2824[1].

Dependency:
P2801[7] is active level for the XOR element.

P2826[2]	**BI: XOR 3**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

P2826[0], P2826[1] define inputs of XOR 3 element, output is P2827.

Index:
P2826[0] : Binector input 0 (BI 0)
P2826[1] : Binector input 1 (BI 1)

Dependency:
P2801[8] is active level for the XOR element.

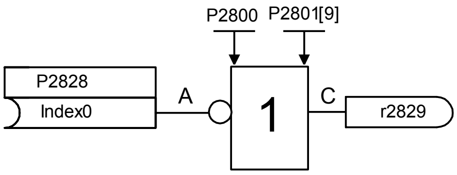
r2827	**BO: XOR 3**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Output of XOR 3 element. Displays exclusive-or logic of bits defined in P2826[0], P2826[1].

Dependency:
P2801[8] is active level for the XOR element.

P2828	**BI: NOT 1**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

P2828 defines input of NOT 1 element, output is P2829.



A	C
0	1
1	0

Dependency:
P2801[9] is active level for the NOT element.

r2829	**BO: NOT 1**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Output of NOT 1 element. Displays not logic of bit defined in P2828.
Dependency:
P2801[9] is active level for the NOT element.

P2830	**BI: NOT 2**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

P2830 defines input of NOT 2 element, output is P2831.
Dependency:
P2801[10] is active level for the NOT element.

r2831	**BO: NOT 2**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Output of NOT 2 element. Displays not logic of bit defined in P2830.
Dependency:
P2801[10] is active level for the NOT element.

P2832	**BI: NOT 3**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

P2832 defines input of NOT 3 element, output is P2833.
Dependency:
P2801[11] is active level for the NOT element.

r2833	**BO: NOT 3**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Output of NOT 3 element. Displays not logic of bit defined in P2832.
Dependency:
P2801[11] is active level for the NOT element.

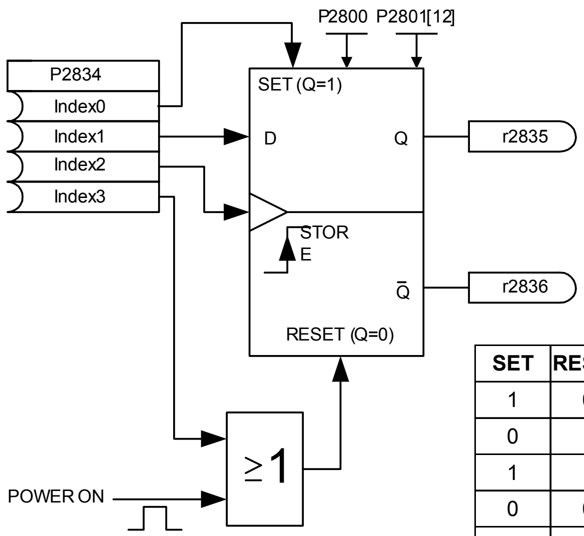
P2834[4] **BI: D-FF 1**

CStat: CUT **Datatype:** U32 **Unit:** - **Min:** 0:0 **Def:** 0:0 **Max:** 4000:0

P-Group: TECH **Active:** first confirm **QuickComm.:** No

Level **3**

P2834[0], P2834[1], P2834[2], P2834[3] define inputs of D-FlipFlop 1, outputs are P2835, P2836.



SET	RESET	D	STORE	Q	$\bar{Q}$
1	0	x	x	1	0
0	1	x	x	0	1
1	1	x	x	Q_{n-1}	$\bar{Q}_{n-1}$
0	0	1	↑	1	0
0	0	0	↑	0	1
POWER-ON				0	1

Index:

P2834[0] : Binector input: Set
P2834[1] : Binector input: D input
P2834[2] : Binector input: Store pulse
P2834[3] : Binector input: Reset

Dependency:

P2801[12] is active level for the D-FlipFlop.

r2835 **BO: Q D-FF 1**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: TECH

Level **3**

Displays output of D-FlipFlop 1, inputs are defined in P2834[0], P2834[1], P2834[2], P2834[3]

Dependency:

P2801[12] is active level for the D-FlipFlop.

r2836 **BO: NOT-Q D-FF 1**

Datatype: U16 **Unit:** - **Min:** - **Def:** - **Max:** -

P-Group: TECH

Level **3**

Displays Not-output of D-FlipFlop 1, inputs are defined in P2834[0], P2834[1], P2834[2], P2834[3]

Dependency:

P2801[12] is active level for the D-FlipFlop.

P2837[4] **BI: D-FF 2**

CStat: CUT **Datatype:** U32 **Unit:** - **Min:** 0:0 **Def:** 0:0 **Max:** 4000:0

P-Group: TECH **Active:** first confirm **QuickComm.:** No

Level **3**

P2837[0], P2837[1], P2837[2], P2837[3] define inputs of D-FlipFlop 2, outputs are P2838, 2839.

Index:

P2837[0] : Binector input: Set
P2837[1] : Binector input: D input
P2837[2] : Binector input: Store pulse
P2837[3] : Binector input: Reset

Dependency:

P2801[13] is active level for the D-FlipFlop.

r2838	**BO: Q D-FF 2**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays output of D-FlipFlop 2, inputs are defined in P2837[0], P2837[1], P2837[2], P2837[3]

Dependency:

P2801[13] is active level for the D-FlipFlop.

r2839	**BO: NOT-Q D-FF 2**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

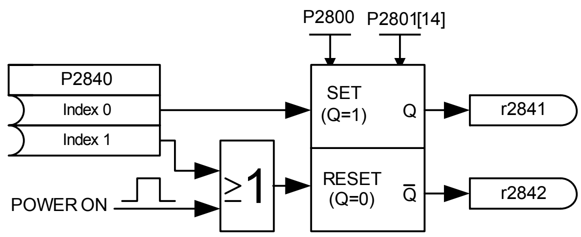
Displays Not-output of D-FlipFlop 2, inputs are defined in P2837[0], P2837[1], P2837[2], P2837[3]

Dependency:

P2801[13] is active level for the D-FlipFlop.

P2840[2]	**BI: RS-FF 1**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

P2840[0], P2840[1] define inputs of RS-FlipFlop 1, outputs are P2841, P2842.



SET	RESET	Q	Q̄
0	0	Q_{n-1}	$\overline{Q}_{n-1}$
0	1	0	1
1	0	1	0
1	1	Q_{n-1}	$\overline{Q}_{n-1}$
POWER-ON		0	1

Index:

P2840[0] : Binector input: Set
P2840[1] : Binector input: Reset

Dependency:

P2801[14] is active level for the RS-FlipFlop.

r2841	**BO: Q RS-FF 1**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays output of RS-FlipFlop 1, inputs are defined in P2840[0], P2840[1]

Dependency:

P2801[14] is active level for the RS-FlipFlop.

r2842	**BO: NOT-Q RS-FF 1**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays Not-output of RS-FlipFlop 1, inputs are defined in P2840[0], P2840[1]

Dependency:

P2801[14] is active level for the RS-FlipFlop.

P2843[2]	**BI: RS-FF 2**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

P2843[0], P2843[1] define inputs of RS-FlipFlop 2, outputs are P2844, P2845.

Index:

P2843[0] : Binector input: Set
P2843[1] : Binector input: Reset

Dependency:

P2801[15] is active level for the RS-FlipFlop.

r2844	**BO: Q RS-FF 2**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays output of RS-FlipFlop 2, inputs are defined in P2843[0], P2843[1]

Dependency:

P2801[15] is active level for the RS-FlipFlop.

r2845	**BO: NOT-Q RS-FF 2**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays Not-output of RS-FlipFlop 2, inputs are defined in P2843[0], P2843[1]

Dependency:

P2801[15] is active level for the RS-FlipFlop.

P2846[2]	**BI: RS-FF 3**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

P2846[0], P2846[1] define inputs of RS-FlipFlop 3, outputs are P2847, P2848.

Index:

P2846[0] : Binector input: Set
P2846[1] : Binector input: Reset

Dependency:

P2801[16] is active level for the RS-FlipFlop.

r2847	**BO: Q RS-FF 3**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays output of RS-FlipFlop 3, inputs are defined in P2846[0], P2846[1]

Dependency:

P2801[16] is active level for the RS-FlipFlop.

r2848	**BO: NOT-Q RS-FF 3**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

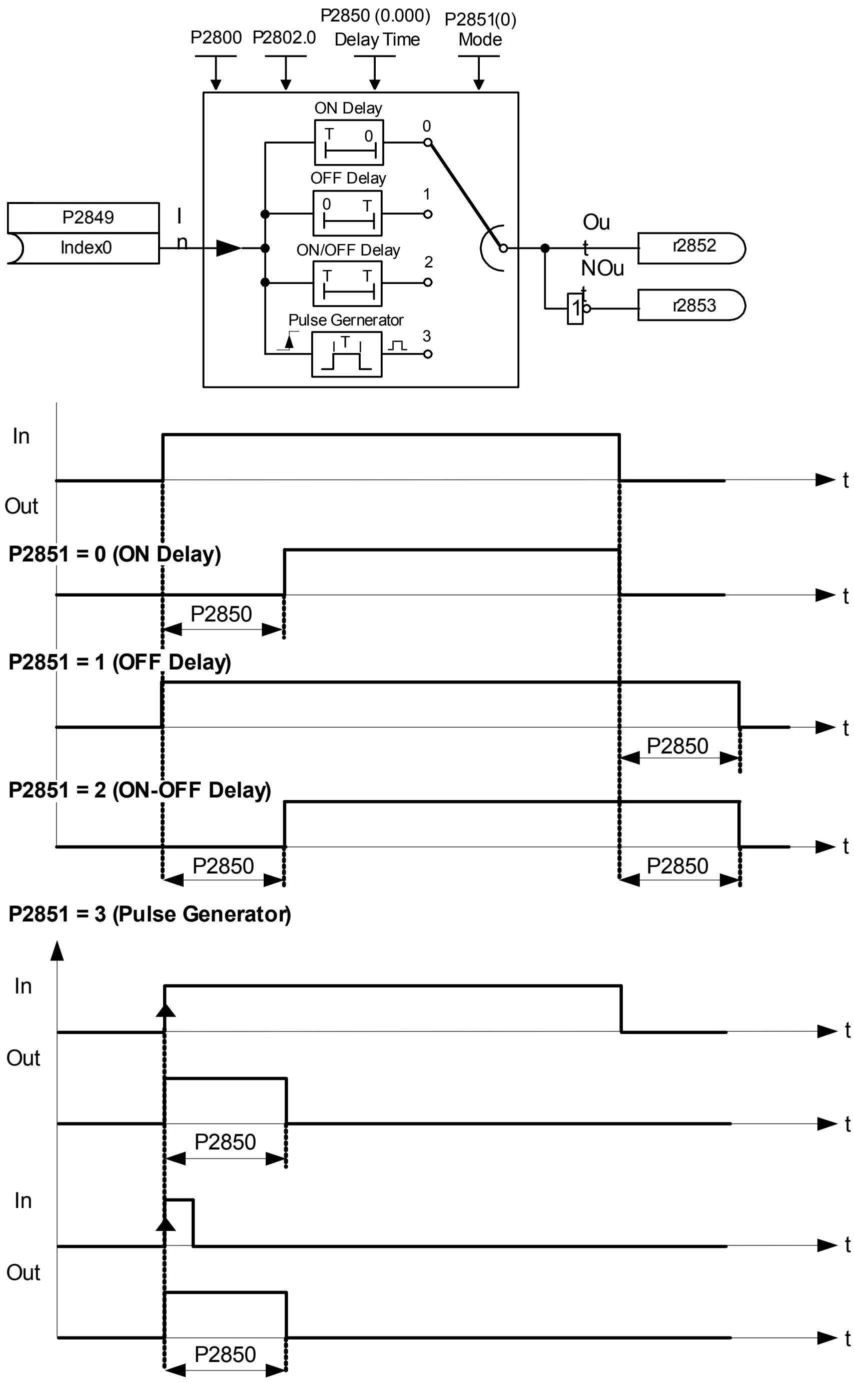
Displays Not-output of RS-FlipFlop 3, inputs are defined in P2846[0], P2846[1]

Dependency:

P2801[16] is active level for the RS-FlipFlop.

							Level
P2849	**BI: Timer 1**				**Min:**	0:0	**3**
	CStat: CUT	**Datatype:** U32	**Unit:** -		**Def:**	0:0	
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No		**Max:**	4000:0	

Define input signal of timer 1. P2849, P2850, P2851 are the inputs of the timer, outputs are P2852, P2853.



Dependency:

P2802[0] is active level for the timer.

							Level
P2850	**Delay time of timer 1**				**Min:**	0.0	**3**
	CStat: CUT	**Datatype:** Float	**Unit:** -		**Def:**	0.0	
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No		**Max:**	9999.9	

Defines delay time of timer 1. P2849, P2850, P2851 are the inputs of the timer, outputs are P2852, P2853.

Dependency:

P2802[0] is active level for the timer.

P2851	**Mode timer 1**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 13	

Selects mode of timer 1. P2849, P2850, P2851 are the inputs of the timer, outputs are P2852, P2853.

Possible Settings:
- 0 ON delay (seconds)
- 1 OFF delay (seconds)
- 2 ON/OFF delay (seconds)
- 3 Pulse generator (seconds)
- 10 ON delay (minutes)
- 11 OFF delay (minutes)
- 12 ON/OFF delay (minutes)
- 13 Pulse generator (minutes)

Dependency:
P2802[0] is active level for the timer.

r2852	**BO: Timer 1**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays output of timer 1. P2849, P2850, P2851 are the inputs of the timer, outputs are P2852, P2853.

Dependency:
P2802[0] is active level for the timer.

r2853	**BO: Nout timer 1**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays Not-output of timer 1. P2849, P2850, P2851 are the inputs of the timer, outputs are P2852, P2853.

Dependency:
P2802[0] is active level for the timer.

P2854	**BI: Timer 2**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Define input signal of timer 2. P2854, P2855, P2856 are the inputs of the timer, outputs are P2857, P2858.

Dependency:
P2802[1] is active level for the timer.

P2855	**Delay time of timer 2**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 0.0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 9999.9	

Defines delay time of timer 2. P2854, P2855, P2856 are the inputs of the timer, outputs are P2857, P2858.

Dependency:
P2802[1] is active level for the timer.

P2856	**Mode timer 2**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 13	

Selects mode of timer 2. P2854, P2855, P2856 are the inputs of the timer, outputs are P2857, P2858.

Possible Settings:
- 0 ON delay (seconds)
- 1 OFF delay (seconds)
- 2 ON/OFF delay (seconds)
- 3 Pulse generator (seconds)
- 10 ON delay (minutes)
- 11 OFF delay (minutes)
- 12 ON/OFF delay (minutes)
- 13 Pulse generator (minutes)

Dependency:
P2802[1] is active level for the timer.

r2857	**BO: Timer 2**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays output of timer 2. P2854, P2855, P2856 are the inputs of the timer, outputs are P2857, P2858.

Dependency:
P2802[1] is active level for the timer.

r2858	**BO: Nout timer 2**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays Not-output of timer 2 P2854, P2855, P2856 are the inputs of the timer, outputs are P2857, P2858.

Dependency:

P2802[1] is active level for the timer.

P2859	**BI: Timer 3**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Define input signal of timer 3. P2859, P2860, P2861 are the inputs of the timer, outputs are P2862, P2863.

Dependency:

P2802[2] is active level for the timer.

P2860	**Delay time of timer 3**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 0.0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 9999.9	

Defines delay time of timer 3. P2859, P2860, P2861 are the inputs of the timer, outputs are P2862, P2863.

Dependency:

P2802[2] is active level for the timer.

P2861	**Mode timer 3**			**Min:** 0	Level
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 13	

Selects mode of timer 3. P2859, P2860, P2861 are the inputs of the timer, outputs are P2862, P2863.

Possible Settings:

0 ON delay (seconds)
1 OFF delay (seconds)
2 ON/OFF delay (seconds)
3 Pulse generator (seconds)
10 ON delay (minutes)
11 OFF delay (minutes)
12 ON/OFF delay (minutes)
13 Pulse generator (minutes)

Dependency:

P2802[2] is active level for the timer.

r2862	**BO: Timer 3**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays output of timer 3. P2859, P2860, P2861 are the inputs of the timer, outputs are P2862, P2863.

Dependency:

P2802[2] is active level for the timer.

r2863	**BO: Nout timer 3**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays Not-output of timer 3. P2859, P2860, P2861 are the inputs of the timer, outputs are P2862, P2863.

Dependency:

P2802[2] is active level for the timer.

P2864	**BI: Timer 4**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 0:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Define input signal of timer 4. P2864, P2865, P2866 are the inputs of the timer, outputs are P2867, P2868.

Dependency:

P2802[3] is active level for the timer.

P2865	**Delay time of timer 4**			**Min:** 0.0	Level
	CStat: CUT	**Datatype:** Float	**Unit:** -	**Def:** 0.0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 9999.9	

Defines delay time of timer 4. P2864, P2865, P2866 are the inputs of the timer, outputs are P2867, P2868.

Dependency:

P2802[3] is active level for the timer.

P2866	**Mode timer 4**			**Min:** 0	Level **3**
	CStat: CUT	**Datatype:** U16	**Unit:** -	**Def:** 0	
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 13	

Selects mode of timer 4. P2864, P2865, P2866 are the inputs of the timer, outputs are P2867, P2868.

Possible Settings:

- 0 ON delay (seconds)
- 1 OFF delay (seconds)
- 2 ON/OFF delay (seconds)
- 3 Pulse generator (seconds)
- 10 ON delay (minutes)
- 11 OFF delay (minutes)
- 12 ON/OFF delay (minutes)
- 13 Pulse generator (minutes)

Dependency:

P2802[3] is active level for the timer.

r2867	**BO: Timer 4**			**Min:** -	Level **3**
		Datatype: U16	**Unit:** -	**Def:** -	
	P-Group: TECH			**Max:** -	

Displays output of timer 4. P2864, P2865, P2866 are the inputs of the timer, outputs are P2867, P2868.

Dependency:

P2802[3] is active level for the timer.

r2868	**BO: Nout timer 4**			**Min:** -	Level **3**
		Datatype: U16	**Unit:** -	**Def:** -	
	P-Group: TECH			**Max:** -	

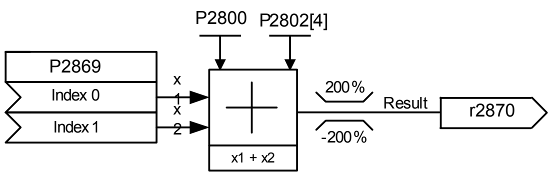
Displays Not-output of timer 4. P2864, P2865, P2866 are the inputs of the timer, outputs are P2867, P2868.

Dependency:

P2802[3] is active level for the timer.

P2869[2]	**CI: ADD 1**			**Min:** 0:0	Level **3**
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 755:0	
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Define inputs of Adder 1, result is in P2870.



Result = x1 + x2

If: x1 + x2 > 200% → Result = 200%

x1 + x2 < -200% → Result = -200%

Index:

P2869[0] : Connector input 0 (CI 0)
P2869[1] : Connector input 1 (CI 1)

Dependency:

P2802[4] is the active level for the Adder.

r2870	**CO: ADD 1**			**Min:** -	Level **3**
		Datatype: Float	**Unit:** %	**Def:** -	
	P-Group: TECH			**Max:** -	

Result of Adder 1.

Dependency:

P2802[4] is active level for the Adder.

P2871[2]	**CI: ADD 2**			**Min:** 0:0	Level **3**
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 755:0	
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Define inputs of Adder 2, result is in P2872.

Index:

P2871[0] : Connector input 0 (CI 0)
P2871[1] : Connector input 1 (CI 1)

Dependency:

P2802[5] is active level for the Adder.

r2872	**CO: ADD 2**			**Min:** -	Level **3**
		Datatype: Float	**Unit:** %	**Def:** -	
	P-Group: TECH			**Max:** -	

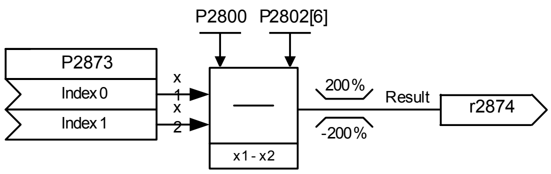
Result of Adder 2.

Dependency:

P2802[5] is active level for the Adder.

P2873[2]	**CI: SUB 1**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 755:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Define inputs of Subtracter 1, result is in P2874.



Result = x1 - x2

If: x1 - x2 > 200% → Result = 200%
x1 - x2 < -200% → Result = -200%

Index:

P2873[0] : Connector input 0 (CI 0)
P2873[1] : Connector input 1 (CI 1)

Dependency:

P2802[6] is active level for the Subtracter.

r2874	**CO: SUB 1**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Result of Subtracter 1.

Dependency:

P2802[6] is active level for the Subtracter.

P2875[2]	**CI: SUB 2**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 755:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Define inputs of Subtracter 2, result is in P2876.

Index:

P2875[0] : Connector input 0 (CI 0)
P2875[1] : Connector input 1 (CI 1)

Dependency:

P2802[7] is active level for the Subtracter.

r2876	**CO: SUB 2**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

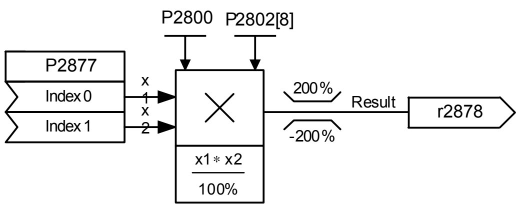
Result of Subtracter 2.

Dependency:

P2802[7] is active level for the Subtracter.

P2877[2]	**CI: MUL 1**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 755:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Define inputs of Multiplier 1, result is in P2878.



$$\textbf{Result} = \frac{x1 * x2}{100\%}$$

If: $\frac{x1 * x2}{100\%}$ > 200% → Result = 200%

$\frac{x1 * x2}{100\%}$ < -200% → Result = -200%

Index:

P2877[0] : Connector input 0 (CI 0)
P2877[1] : Connector input 1 (CI 1)

Dependency:

P2802[8] is active level for the Multiplier.

r2878	**CO: MUL 1**			**Min:** -	Level
		Datatype: Float	**Unit:** %	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Result of Multiplier 1.

Dependency:

P2802[8] is active level for the Multiplier.

P2879[2]	**CI: MUL 2**			**Min:**	0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:**	755:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:**	4000:0	

Define inputs of Multiplier 2, result is in P2880.

Index:

P2879[0] : Connector input 0 (CI 0)
P2879[1] : Connector input 1 (CI 1)

Dependency:

P2802[9] is active level for the Multiplier.

r2880	**CO: MUL 2**			**Min:**	-	Level
		Datatype: Float	**Unit:** %	**Def:**	-	**3**
	P-Group: TECH			**Max:**	-	

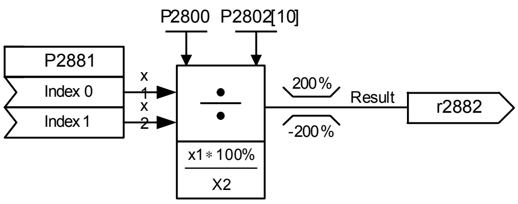
Result of Multiplier 2.

Dependency:

P2802[9] is active level for the Multiplier.

P2881[2]	**CI: DIV 1**			**Min:**	0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:**	755:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:**	4000:0	

Define inputs of Divider 1, result is in P2882.



$$\text{Result} = \frac{x1 * 100\%}{x2}$$

If: $\frac{x1 * 100\%}{x2} > 200\% \rightarrow$ Result = 200%

$\frac{x1 * 100\%}{x2} < -200\% \rightarrow$ Result = -200%

Index:

P2881[0] : Connector input 0 (CI 0)
P2881[1] : Connector input 1 (CI 1)

Dependency:

P2802[10] is active level for the Divider.

r2882	**CO: DIV 1**			**Min:**	-	Level
		Datatype: Float	**Unit:** %	**Def:**	-	**3**
	P-Group: TECH			**Max:**	-	

Result of Divider 1.

Dependency:

P2802[10] is active level for the Divider.

P2883[2]	**CI: DIV 2**			**Min:**	0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:**	755:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:**	4000:0	

Define inputs of Divider 2, result is in P2884.

Index:

P2883[0] : Connector input 0 (CI 0)
P2883[1] : Connector input 1 (CI 1)

Dependency:

P2802[11] is active level for the Divider.

r2884	**CO: DIV 2**			**Min:**	-	Level
		Datatype: Float	**Unit:** %	**Def:**	-	**3**
	P-Group: TECH			**Max:**	-	

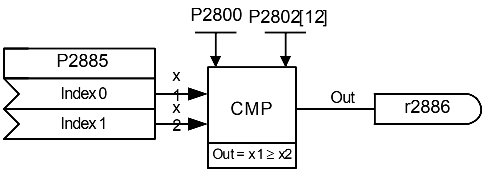
Result of Divider 2.

Dependency:

P2802[11] is active level for the Divider.

P2885[2]	**CI: CMP 1**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 755:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines inputs of Comparator 1, output is P2886.



x1 ≥ x2 → Out = 1
x1 < x2 → Out = 0

Index:

P2885[0] : Connector input 0 (CI 0)
P2885[1] : Connector input 1 (CI 1)

Dependency:

P2802[12] is active level for the Comparator.

r2886	**BO: CMP 1**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays result bit of Comparator 1.

Dependency:

P2802[12] is active level for the Comparator.

P2887[2]	**CI: CMP 2**			**Min:** 0:0	Level
	CStat: CUT	**Datatype:** U32	**Unit:** -	**Def:** 755:0	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 4000:0	

Defines inputs of Comparator 2, output is P2888.

Index:

P2887[0] : Connector input 0 (CI 0)
P2887[1] : Connector input 1 (CI 1)

Dependency:

P2802[13] is active level for the Comparator.

r2888	**BO: CMP 2**			**Min:** -	Level
		Datatype: U16	**Unit:** -	**Def:** -	**3**
	P-Group: TECH			**Max:** -	

Displays result bit of Comparator 2.

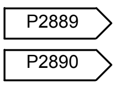
Dependency:

P2802[13] is active level for the Comparator.

P2889	**CO: Fixed setpoint 1 in [%]**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 0.00	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 200.00	

Fixed percent setting 1.

Connector Setting in %



Range : -200% ... 200%

P2890	**CO: Fixed setpoint 2 in [%]**			**Min:** -200.00	Level
	CStat: CUT	**Datatype:** Float	**Unit:** %	**Def:** 0.00	**3**
	P-Group: TECH	**Active:** first confirm	**QuickComm.:** No	**Max:** 200.00	

Fixed percent setting 2.

3.40 Inverter parameters

P3900	End of quick commissioning			Min: 0	Level 1
	CStat: C	Datatype: U16	Unit: -	Def: 0	
	P-Group: QUICK	Active: first confirm	QuickComm.: Yes	Max: 3	

Performs calculations necessary for optimized motor operation.

After completion of calculation, P3900 and P0010 (parameter groups for commissioning) are automatically reset to their original value 0.

Possible Settings:

0 No quick commissioning
1 Start quick commissioning with factory reset
2 Start quick commissioning
3 Start quick commissioning only for motor data

Dependency:

Changeable only when P0010 = 1 (quick commissioning)

Note:

P3900 = 1 :
When setting 1 is selected, only the parameter settings carried out via the commissioning menu "Quick commissioning", are retained; all other parameter changes, including the I/O settings, are lost. Motor calculations are also performed.

P3900 = 2 :
When setting 2 is selected, only those parameters, which depend on the parameters in the commissioning menu "Quick commissioning" (P0010 = 1) are calculated. The I/O settings are also reset to default and the motor calculations performed.

P3900 = 3 :
When setting 3 is selected, only the motor and controller calculations are performed. Exiting quick commissioning with this setting saves time (for example, if only motor rating plate data have been changed).

Calculates a variety of motor parameters, overwriting previous values (see parameter P0340, setting P0340 = 1).

P3950	Access of hidden parameters			Min: 0	Level 4
	CStat: CUT	Datatype: U16	Unit: -	Def: 0	
	P-Group: ALWAYS	Active: first confirm	QuickComm.: No	Max: 255	

Accesses special parameters for development (expert only) and factory functionality (calibration parameter).

r3954[13]	CM version and GUI ID			Min: -	Level 4
		Datatype: U16	Unit: -	Def: -	
	P-Group: -			Max: -	

Used to classify firmware (only for SIEMENS internal purposes).

Index:

r3954[0] : CM version (major release)
r3954[1] : CM version (minor release)
r3954[2] : CM version (baselevel or patch)
r3954[3] : GUI ID
r3954[4] : GUI ID
r3954[5] : GUI ID
r3954[6] : GUI ID
r3954[7] : GUI ID
r3954[8] : GUI ID
r3954[9] : GUI ID
r3954[10] : GUI ID
r3954[11] : GUI ID major release
r3954[12] : GUI ID minor release

P3980	**Commissioning command selection**			**Min:**	0	Level **4**
	CStat: T	**Datatype:** U16	**Unit:** -	**Def:**	0	
	P-Group: -	**Active:** first confirm	**QuickComm.:** No	**Max:**	67	

Toggles command and setpoint sources between freely programmable BICO parameters and fixed command/setpoint profiles for commissioning.

The command and setpoint sources can be changed independently. The tens digit selects the command source, the ones digit the setpoint source.

Possible Settings:

0	Cmd = BICO parameter	Setpoint = BICO parameter
1	Cmd = BICO parameter	Setpoint = MOP setpoint
2	Cmd = BICO parameter	Setpoint = Analog setpoint
3	Cmd = BICO parameter	Setpoint = Fixed frequency
4	Cmd = BICO parameter	Setpoint = USS on BOP link
5	Cmd = BICO parameter	Setpoint = USS on COM link
6	Cmd = BICO parameter	Setpoint = CB on COM link
7	Cmd = BICO parameter	Setpoint = Analog 2 setp
10	Cmd = BOP	Setpoint = BICO parameter
11	Cmd = BOP	Setpoint = MOP setpoint
12	Cmd = BOP	Setpoint = Analog setpoint
13	Cmd = BOP	Setpoint = Fixed frequency
15	Cmd = BOP	Setpoint = USS on COM link
16	Cmd = BOP	Setpoint = CB on COM link
17	Cmd = BOP	Setpoint = Analog 2 setp
40	Cmd = USS on BOP link	Setpoint = BICO parameter
41	Cmd = USS on BOP link	Setpoint = MOP setpoint
42	Cmd = USS on BOP link	Setpoint = Analog setpoint
43	Cmd = USS on BOP link	Setpoint = Fixed frequency
44	Cmd = USS on BOP link	Setpoint = USS on BOP link
45	Cmd = USS on BOP link	Setpoint = USS on COM link
46	Cmd = USS on BOP link	Setpoint = CB on COM link
47	Cmd = USS on BOP link	Setpoint = Analog 2 setp
50	Cmd = USS on COM link	Setpoint = BICO parameter
51	Cmd = USS on COM link	Setpoint = MOP setpoint
52	Cmd = USS on COM link	Setpoint = Analog setpoint
53	Cmd = USS on COM link	Setpoint = Fixed frequency
54	Cmd = USS on COM link	Setpoint = USS on BOP link
55	Cmd = USS on COM link	Setpoint = USS on COM link
57	Cmd = USS on COM link	Setpoint = Analog 2 setp
60	Cmd = CB on COM link	Setpoint = BICO parameter
61	Cmd = CB on COM link	Setpoint = MOP setpoint
62	Cmd = CB on COM link	Setpoint = Analog setpoint
63	Cmd = CB on COM link	Setpoint = Fixed frequency
64	Cmd = CB on COM link	Setpoint = USS on BOP link
66	Cmd = CB on COM link	Setpoint = CB on COM link
67	Cmd = CB on COM link	Setpoint = Analog 2 setp

P3981	**Reset active fault**			**Min:**	0	Level **4**
	CStat: CT	**Datatype:** U16	**Unit:** -	**Def:**	0	
	P-Group: ALARMS	**Active:** first confirm	**QuickComm.:** No	**Max:**	1	

Resets active faults when changed from 0 to 1.

Possible Settings:

0 No fault reset
1 Reset fault

Note:

Automatically reset to 0.

Details:

See r0947 (last fault code)

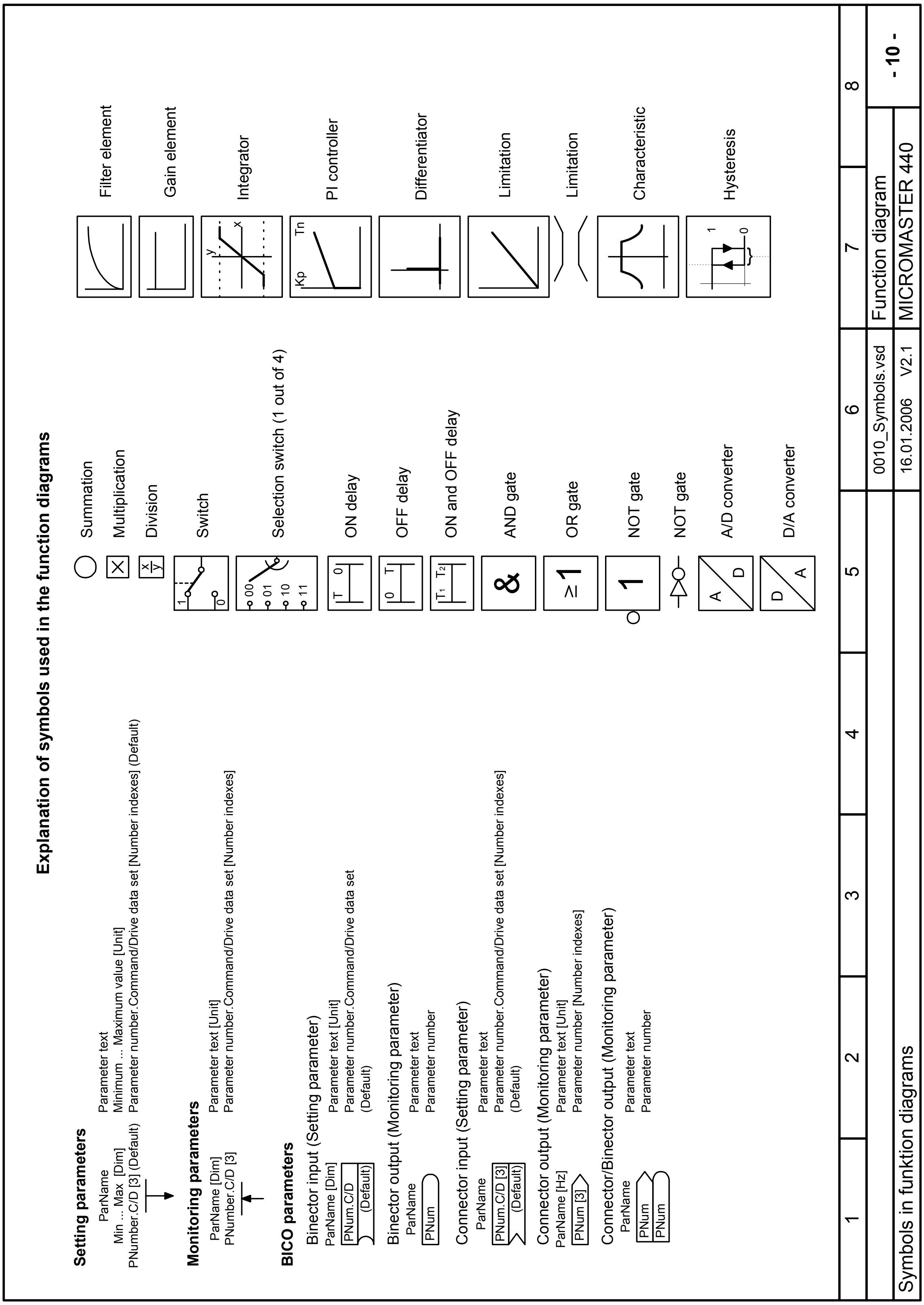
r3986[2]	**Number of parameters**			**Min:**	-	Level **4**
		Datatype: U16	**Unit:** -	**Def:**	-	
	P-Group: -			**Max:**	-	

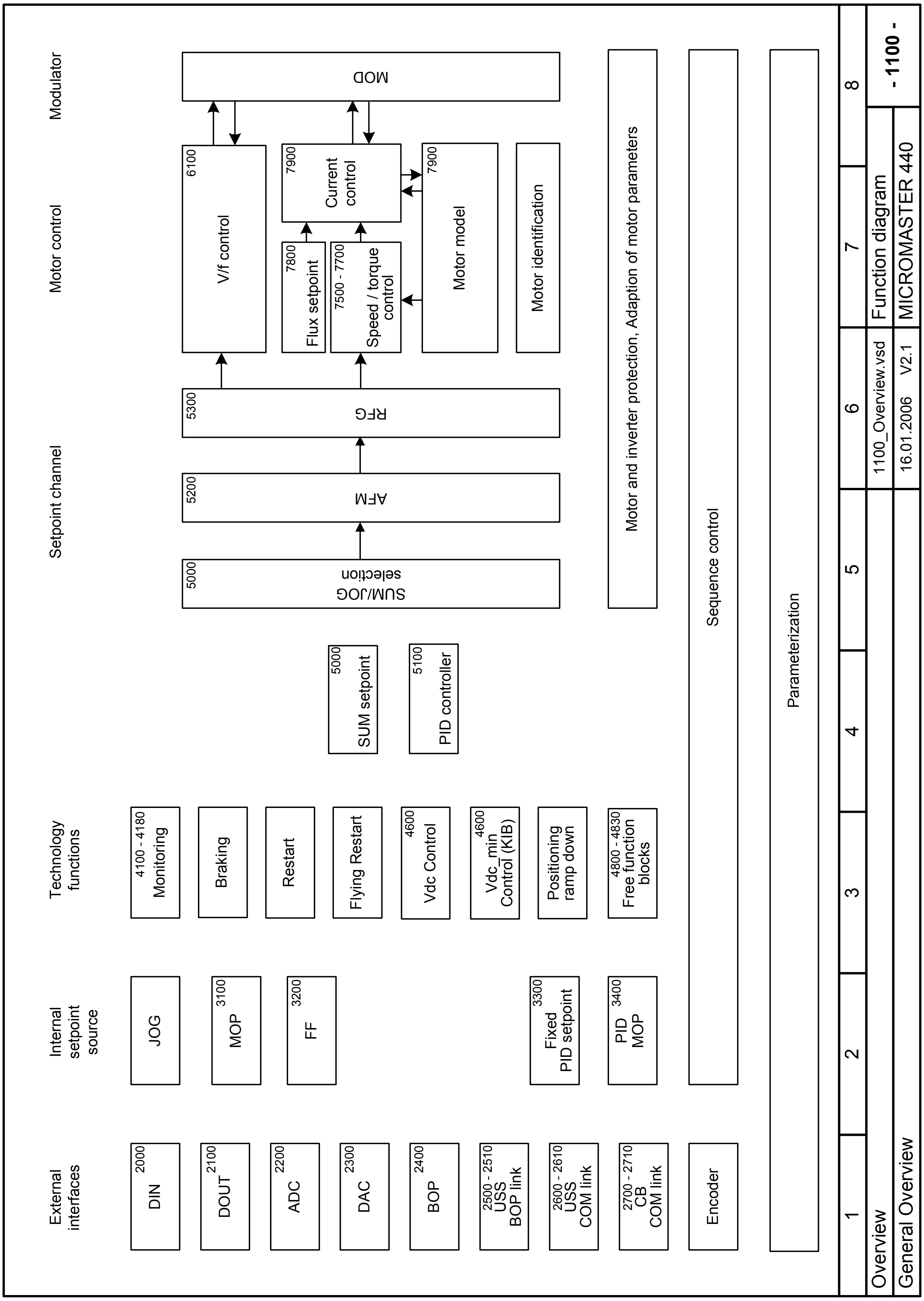
Number of parameters on the drive

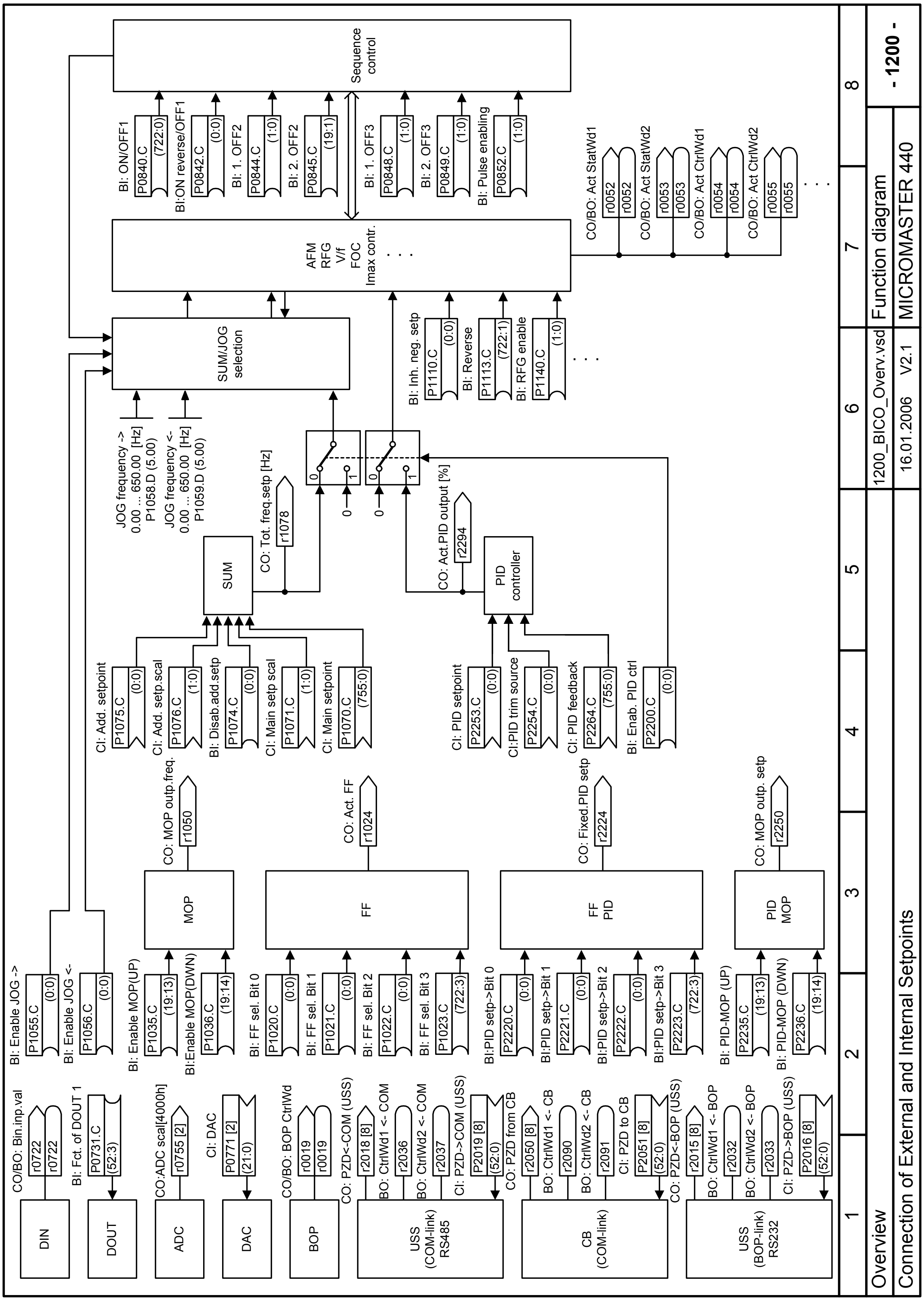
Index:

r3986[0] : Read only
r3986[1] : Read & write

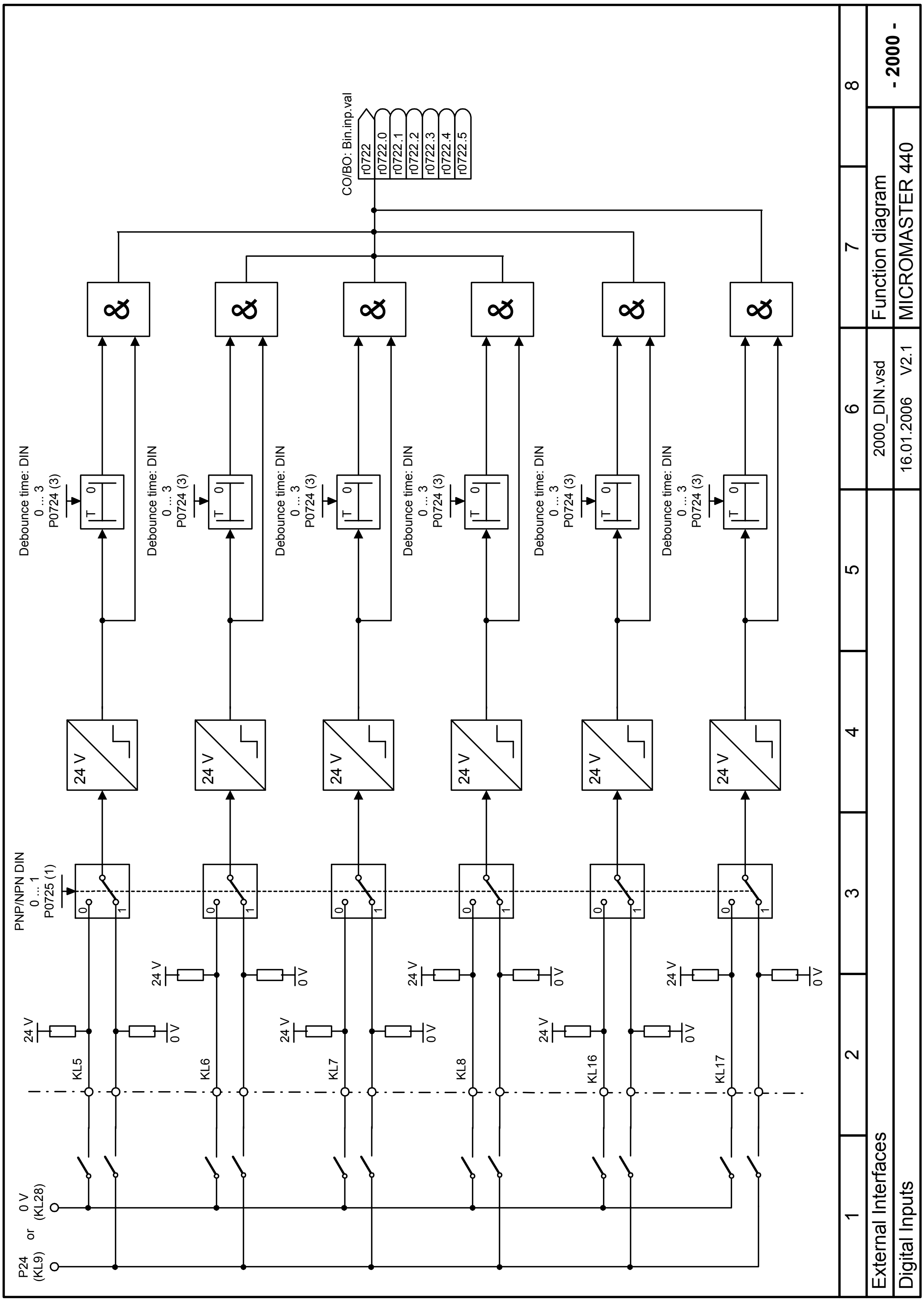
4 Function Diagrams

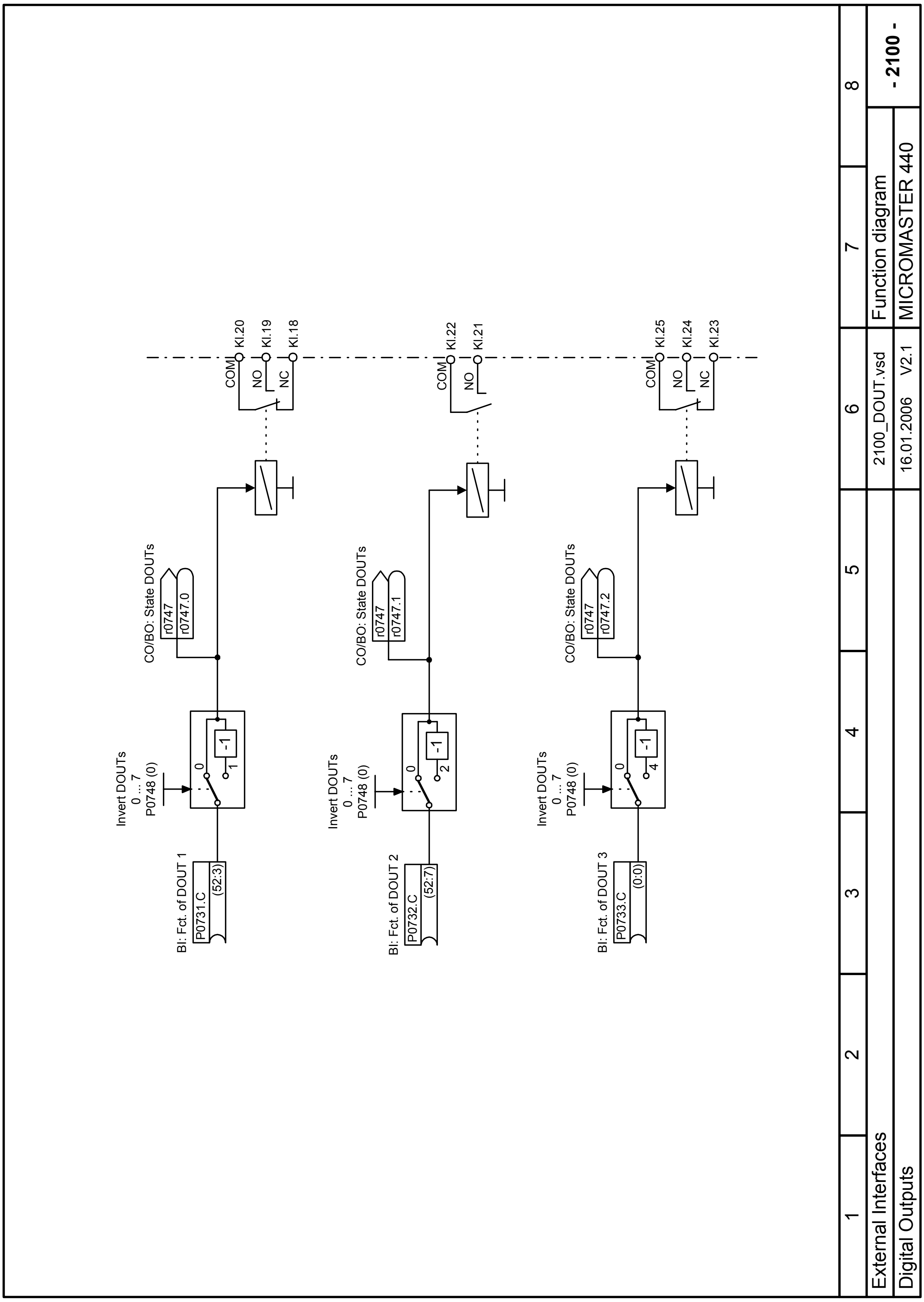


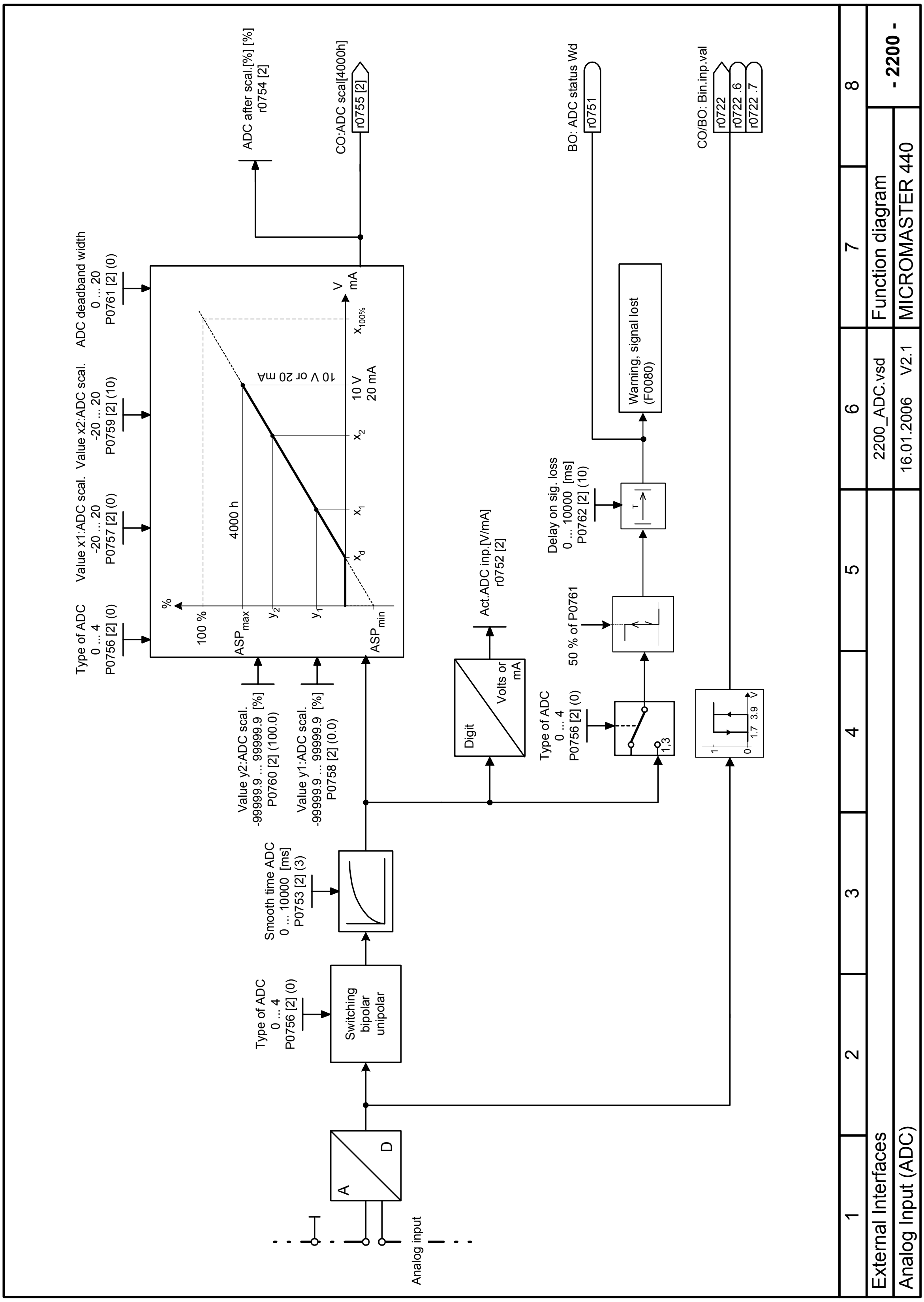

External interfaces
Internal setpoint source
Technology functions
Setpoint channel
Motor control
Modulator
2000 DIN
2100 DOUT
2200 ADC
2300 DAC
2400 BOP
2500 - 2510 USS BOP link
2600 - 2610 USS COM link
2700 - 2710 CB COM link
Encoder
JOG
3100 MOP
3200 FF
3300 Fixed PID setpoint
3400 PID MOP
4100 - 4180 Monitoring
Braking
Restart
Flying Restart
4600 Vdc Control
4600 Vdc_min Control (KIB)
Positioning ramp down
4800 - 4830 Free function blocks
5000 SUM setpoint
5100 PID controller
5000 SUM/JOG selection
5200 AFM
5300 RFG
6100 V/f control
7800 Flux setpoint
7500 - 7700 Speed / torque control
7900 Current control
7900 Motor model
Motor identification
MOD
Motor and inverter protection, Adaption of motor parameters
Sequence control
Parameterization
1
2
3
4
5
6
7
8
Overview
1100_Overview.vsd
Function diagram
- 1100 -
General Overview
16.01.2006
V2.1
MICROMASTER 440

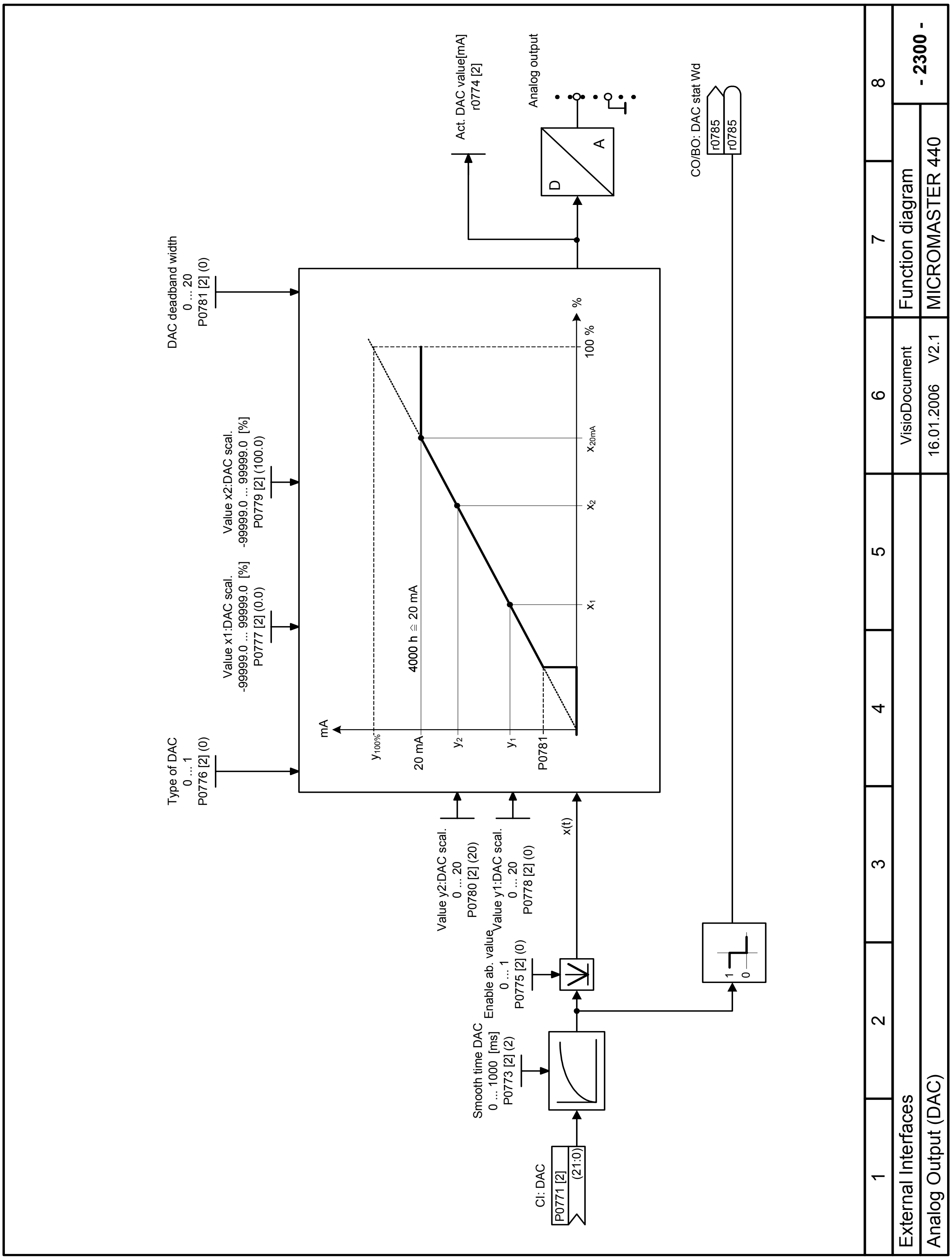


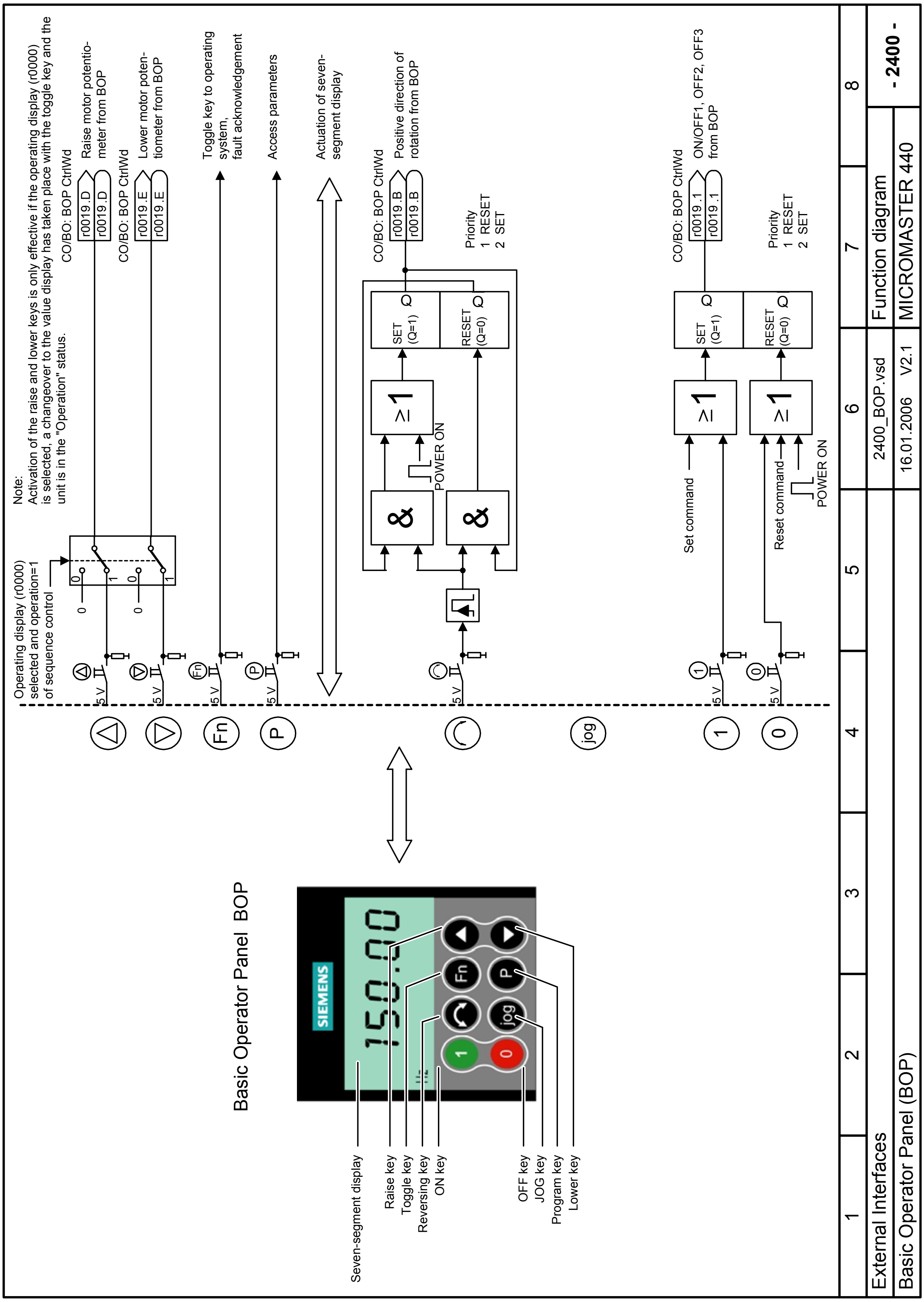
DIN
DOUT
ADC
DAC
BOP
USS (COM-link) RS485
CB (COM-link)
USS (BOP-link) RS232
CO/BO: Bin.inp.val
r0722
BI: Fct. of DOUT 1
P0731.C
(52:3)
CO:ADC scal[4000h]
r0755 [2]
CI: DAC
P0771 [2]
(21:0)
CO/BO: BOP CtrlWd
r0019
CO: PZD<-COM (USS)
r2018 [8]
BO: CtrlWd1 <- COM
r2036
BO: CtrlWd2 <- COM
r2037
CI: PZD->COM (USS)
P2019 [8]
(52:0)
CO: PZD from CB
r2050 [8]
BO: CtrlWd1 <- CB
r2090
BO: CtrlWd2 <- CB
r2091
CI: PZD to CB
P2051 [8]
(52:0)
CO: PZD<-BOP (USS)
r2015 [8]
BO: CtrlWd1 <- BOP
r2032
BO: CtrlWd2 <- BOP
r2033
CI: PZD->BOP (USS)
P2016 [8]
(52:0)
BI: Enable JOG ->
P1055.C
(0:0)
BI: Enable JOG <-
P1056.C
(0:0)
BI: Enable MOP(UP)
P1035.C
(19:13)
BI:Enable MOP(DWN)
P1036.C
(19:14)
BI: FF sel. Bit 0
P1020.C
(0:0)
BI: FF sel. Bit 1
P1021.C
(0:0)
BI: FF sel. Bit 2
P1022.C
(0:0)
BI: FF sel. Bit 3
P1023.C
(722:3)
BI:PID setp->Bit 0
P2220.C
(0:0)
BI:PID setp->Bit 1
P2221.C
(0:0)
BI:PID setp->Bit 2
P2222.C
(0:0)
BI:PID setp->Bit 3
P2223.C
(722:3)
BI: PID-MOP (UP)
P2235.C
(19:13)
BI: PID-MOP (DWN)
P2236.C
(19:14)
MOP
FF
FF PID
PID MOP
CO: MOP outp.freq.
r1050
CO: Act. FF
r1024
CO: Fixed.PID setp
r2224
CO: MOP outp. setp
r2250
CI: Add. setpoint
P1075.C
(0:0)
CI: Add. setp.scal
P1076.C
(1:0)
BI: Disab.add.setp
P1074.C
(0:0)
CI: Main setp scal
P1071.C
(1:0)
CI: Main setpoint
P1070.C
(755:0)
CI: PID setpoint
P2253.C
(0:0)
CI:PID trim source
P2254.C
(0:0)
CI: PID feedback
P2264.C
(755:0)
BI: Enab. PID ctrl
P2200.C
(0:0)
SUM
CO: Tot. freq.setp [Hz]
r1078
PID controller
CO: Act.PID output [%]
r2294
JOG frequency ->
0.00 ... 650.00 [Hz]
P1058.D (5.00)
JOG frequency <-
0.00 ... 650.00 [Hz]
P1059.D (5.00)
SUM/JOG selection
BI: Inh. neg. setp
P1110.C
(0:0)
BI: Reverse
P1113.C
(722:1)
BI: RFG enable
P1140.C
(1:0)
AFM
RFG
V/f
FOC
Imax contr.
BI: ON/OFF1
P0840.C
(722:0)
BI:ON reverse/OFF1
P0842.C
(0:0)
BI: 1. OFF2
P0844.C
(1:0)
BI: 2. OFF2
P0845.C
(19:1)
BI: 1. OFF3
P0848.C
(1:0)
BI: 2. OFF3
P0849.C
(1:0)
BI: Pulse enabling
P0852.C
(1:0)
Sequence control
CO/BO: Act StatWd1
r0052
CO/BO: Act StatWd2
r0053
CO/BO: Act CtrlWd1
r0054
CO/BO: Act CtrlWd2
r0055
1
2
3
4
5
6
7
8
Overview
Connection of External and Internal Setpoints
1200_BICO_Overv.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 1200 -

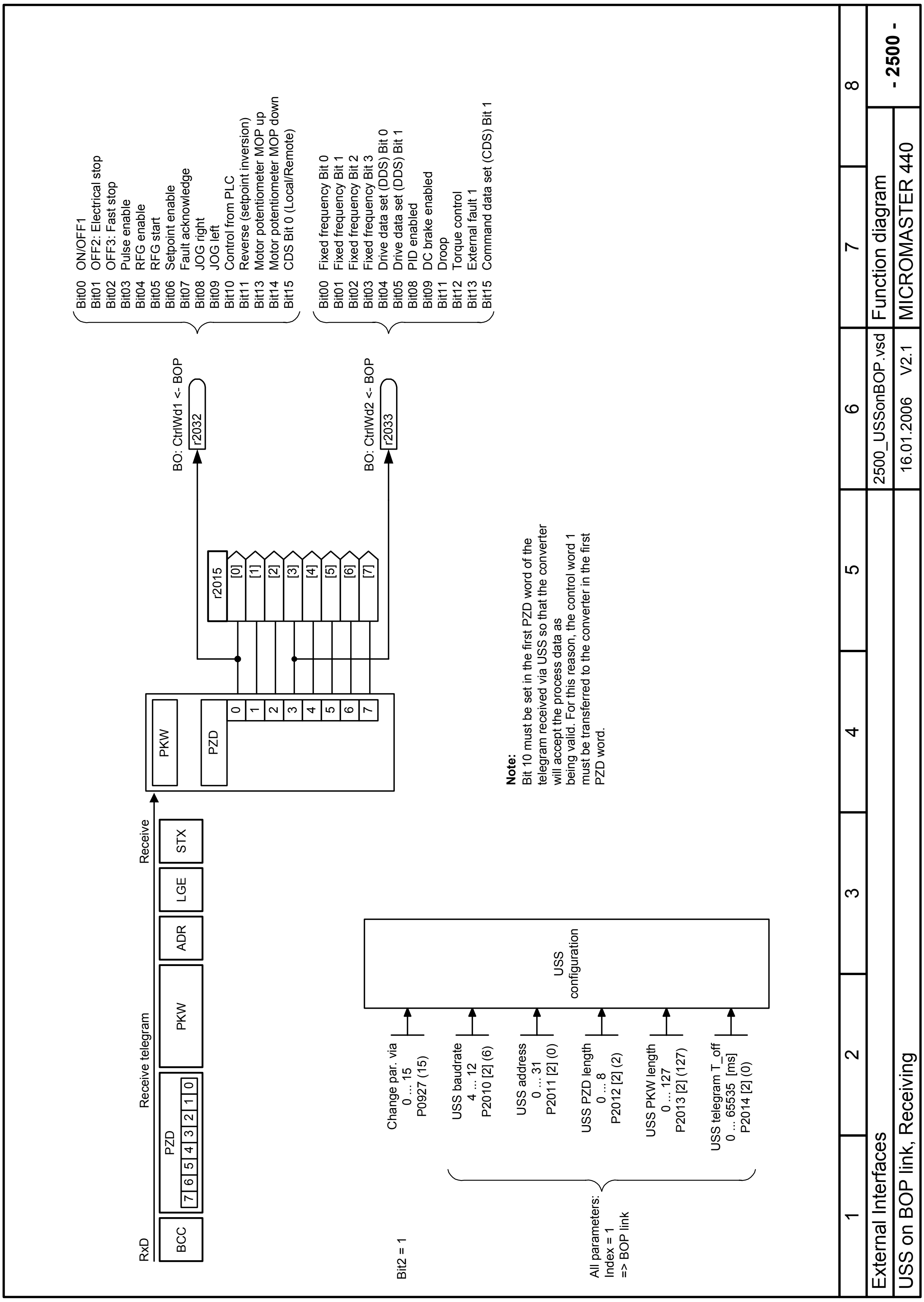

P24
(KL9)
or
0 V
(KL28)
KL5
KL6
KL7
KL8
KL16
KL17
24 V
0 V
PNP/NPN DIN
0 ... 1
P0725 (1)
24 V
Debounce time: DIN
0 ... 3
P0724 (3)
T 0
&
CO/BO: Bin.inp.val
r0722
r0722.0
r0722.1
r0722.2
r0722.3
r0722.4
r0722.5
1
2
3
4
5
6
7
8
External Interfaces
Digital Inputs
2000_DIN.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 2000 -

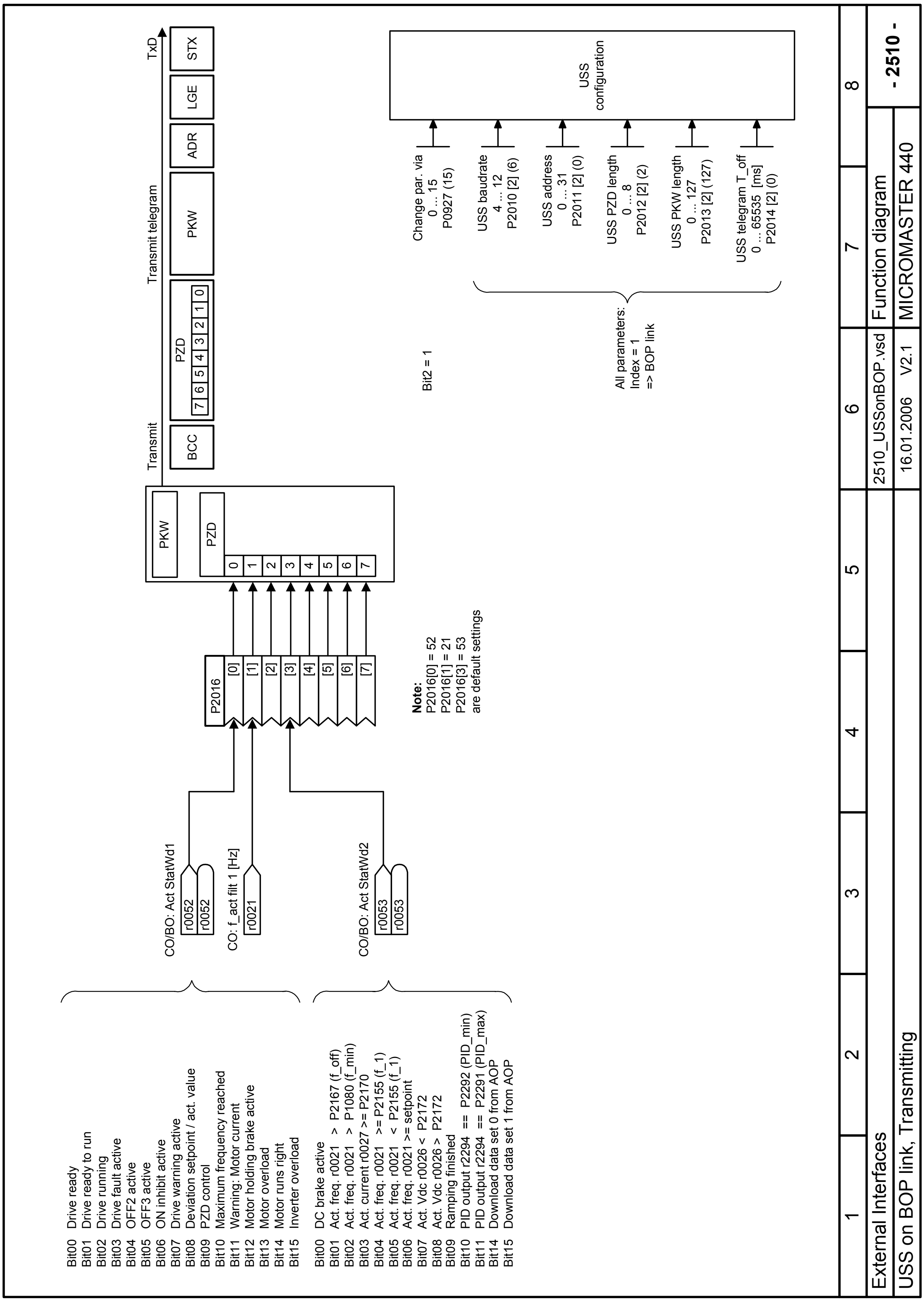

BI: Fct. of DOUT 1
P0731.C
(52:3)
Invert DOUTs
0 ... 7
P0748 (0)
0
1
-1
CO/BO: State DOUTs
r0747
r0747.0
COM
NO
NC
Kl.20
Kl.19
Kl.18
BI: Fct. of DOUT 2
P0732.C
(52:7)
Invert DOUTs
0 ... 7
P0748 (0)
0
2
-1
CO/BO: State DOUTs
r0747
r0747.1
COM
NO
Kl.22
Kl.21
BI: Fct. of DOUT 3
P0733.C
(0:0)
Invert DOUTs
0 ... 7
P0748 (0)
0
4
-1
CO/BO: State DOUTs
r0747
r0747.2
COM
NO
NC
Kl.25
Kl.24
Kl.23
1
2
3
4
5
6
7
8
External Interfaces
Digital Outputs
2100_DOUT.vsd
16.01.2006
V2.1
Function diagram
MICROMASTER 440
- 2100 -

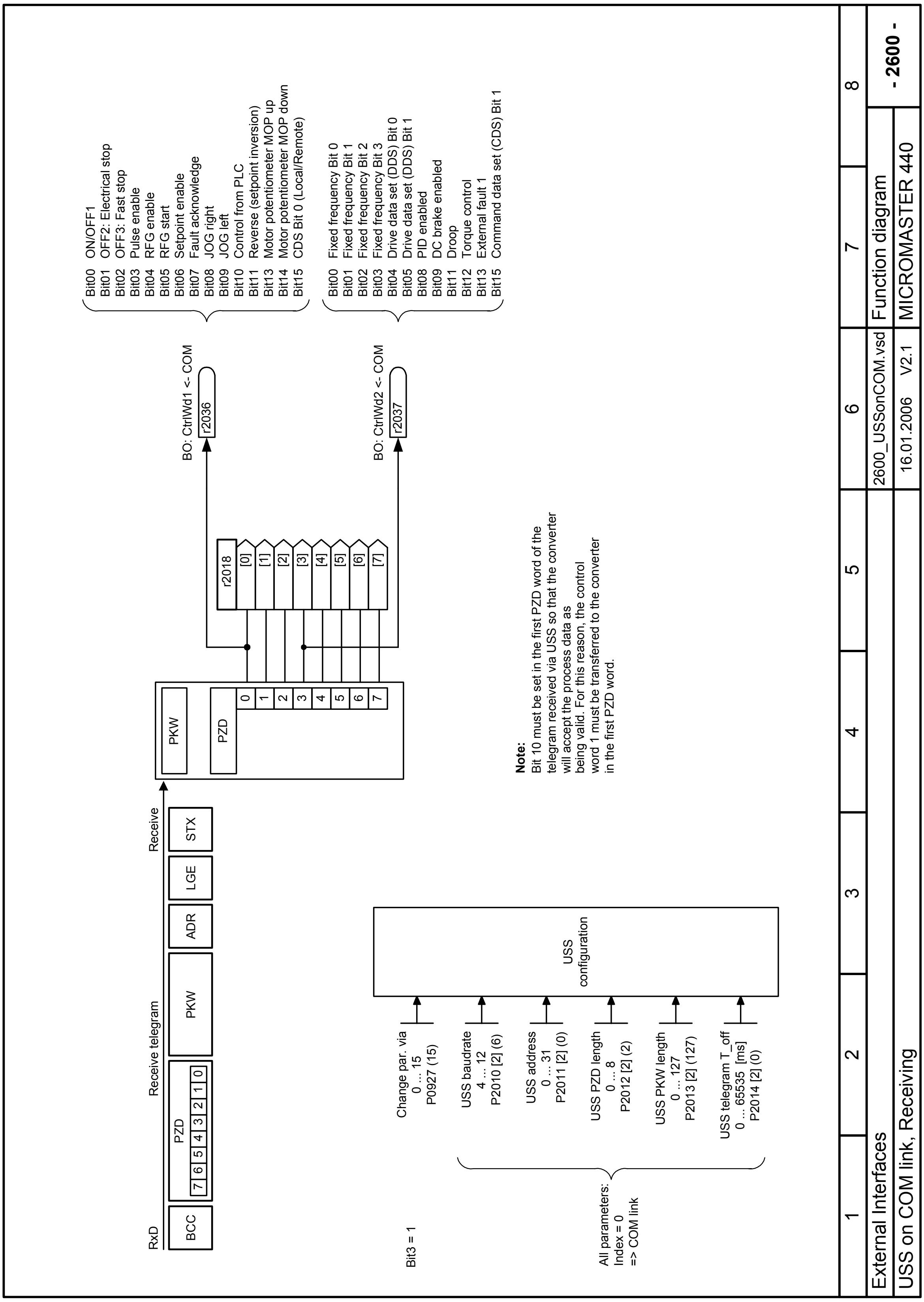

Analog input
A
D
Type of ADC
0 ... 4
P0756 [2] (0)
Switching
bipolar
unipolar
Smooth time ADC
0 ... 10000 [ms]
P0753 [2] (3)
Value y2:ADC scal.
-99999.9 ... 99999.9 [%]
P0760 [2] (100.0)
Value y1:ADC scal.
-99999.9 ... 99999.9 [%]
P0758 [2] (0.0)
Type of ADC
0 ... 4
P0756 [2] (0)
Value x1:ADC scal.
-20 ... 20
P0757 [2] (0)
Value x2:ADC scal.
-20 ... 20
P0759 [2] (10)
ADC deadband width
0 ... 20
P0761 [2] (0)
%
100 %
ASP_max
y2
y1
ASP_min
4000 h
x_d
x_1
x_2
10 V
20 mA
10 V or 20 mA
x_100%
V
mA
ADC after scal.[%] [%]
r0754 [2]
CO:ADC scal[4000h]
r0755 [2]
Digit
Volts or mA
Act.ADC inp.[V/mA]
r0752 [2]
Type of ADC
0 ... 4
P0756 [2] (0)
1,3
50 % of P0761
Delay on sig. loss
0 ... 10000 [ms]
P0762 [2] (10)
T
Warning, signal lost
(F0080)
BO: ADC status Wd
r0751
1
0
1.7 3.9 V
CO/BO: Bin.inp.val
r0722
r0722 .6
r0722 .7
1
2
3
4
5
6
7
8
External Interfaces
Analog Input (ADC)
2200_ADC.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 2200 -


External Interfaces
Analog Output (DAC)
VisioDocument
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 2300 -
1
2
3
4
5
6
7
8
CI: DAC
P0771 [2]
(21:0)
Smooth time DAC
0 ... 1000 [ms]
P0773 [2] (2)
Enable ab. value
0 ... 1
P0775 [2] (0)
Value y2:DAC scal.
0 ... 20
P0780 [2] (20)
Value y1:DAC scal.
0 ... 20
P0778 [2] (0)
x(t)
1
0
Type of DAC
0 ... 1
P0776 [2] (0)
Value x1:DAC scal.
-99999.0 ... 99999.0 [%]
P0777 [2] (0.0)
Value x2:DAC scal.
-99999.0 ... 99999.0 [%]
P0779 [2] (100.0)
DAC deadband width
0 ... 20
P0781 [2] (0)
mA
y100%
20 mA
y2
y1
P0781
4000 h ≙ 20 mA
x1
x2
x20mA
100 %
%
Act. DAC value[mA]
r0774 [2]
D
A
Analog output
CO/BO: DAC stat Wd
r0785
r0785

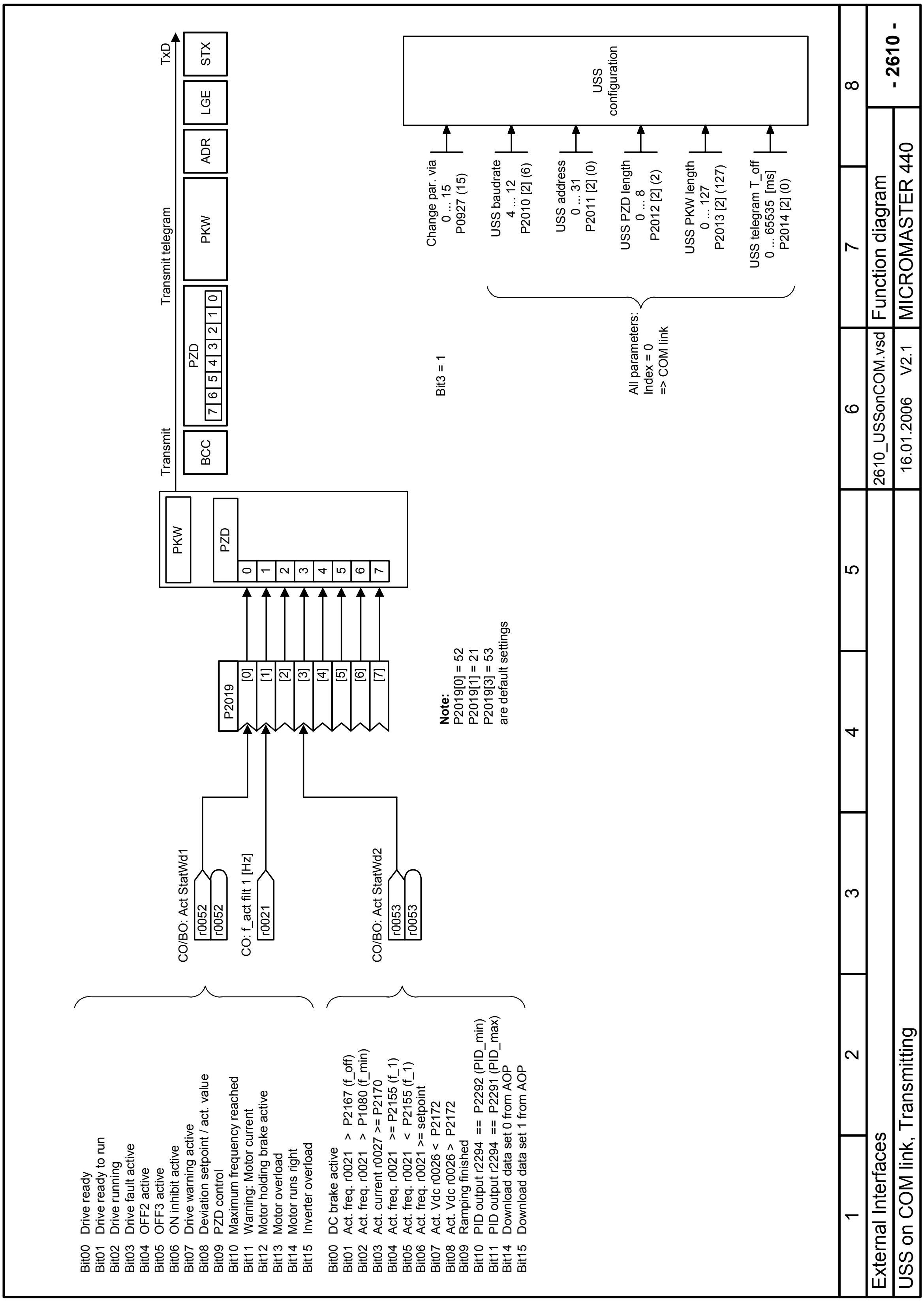

Note:
Activation of the raise and lower keys is only effective if the operating display (r0000) is selected, a changeover to the value display has taken place with the toggle key and the unit is in the "Operation" status.
Operating display (r0000) selected and operation=1 of sequence control
CO/BO: BOP CtrlWd
r0019.D
Raise motor potentiometer from BOP
CO/BO: BOP CtrlWd
r0019.E
Lower motor potentiometer from BOP
Toggle key to operating system, fault acknowledgement
Access parameters
Actuation of seven-segment display
CO/BO: BOP CtrlWd
r0019.B
Positive direction of rotation from BOP
Priority
1 RESET
2 SET
SET (Q=1)
RESET (Q=0)
POWER ON
Set command
Reset command
CO/BO: BOP CtrlWd
r0019.1
ON/OFF1, OFF2, OFF3 from BOP
Basic Operator Panel BOP
SIEMENS
Seven-segment display
Raise key
Toggle key
Reversing key
ON key
OFF key
JOG key
Program key
Lower key
1
2
3
4
5
6
7
8
External Interfaces
Basic Operator Panel (BOP)
Function diagram
MICROMASTER 440
2400_BOP.vsd
16.01.2006 V2.1
- 2400 -

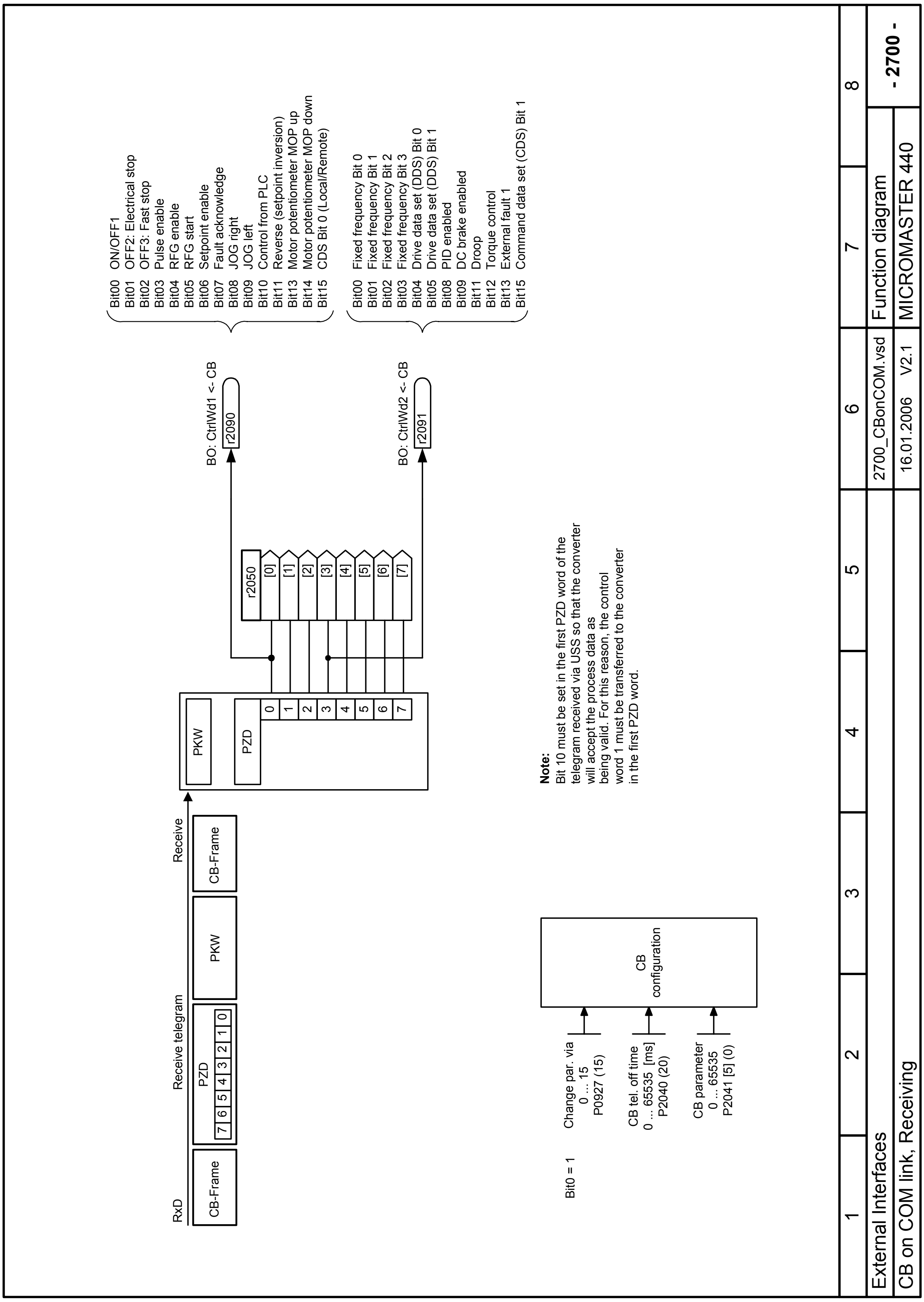

RxD
Receive telegram
Receive
BCC
PZD
7 6 5 4 3 2 1 0
PKW
ADR
LGE
STX
PKW
PZD
0 1 2 3 4 5 6 7
r2015
[0] [1] [2] [3] [4] [5] [6] [7]
BO: CtrlWd1 <- BOP
r2032
BO: CtrlWd2 <- BOP
r2033
Bit00 ON/OFF1
Bit01 OFF2: Electrical stop
Bit02 OFF3: Fast stop
Bit03 Pulse enable
Bit04 RFG enable
Bit05 RFG start
Bit06 Setpoint enable
Bit07 Fault acknowledge
Bit08 JOG right
Bit09 JOG left
Bit10 Control from PLC
Bit11 Reverse (setpoint inversion)
Bit13 Motor potentiometer MOP up
Bit14 Motor potentiometer MOP down
Bit15 CDS Bit 0 (Local/Remote)
Bit00 Fixed frequency Bit 0
Bit01 Fixed frequency Bit 1
Bit02 Fixed frequency Bit 2
Bit03 Fixed frequency Bit 3
Bit04 Drive data set (DDS) Bit 0
Bit05 Drive data set (DDS) Bit 1
Bit08 PID enabled
Bit09 DC brake enabled
Bit11 Droop
Bit12 Torque control
Bit13 External fault 1
Bit15 Command data set (CDS) Bit 1
Note:
Bit 10 must be set in the first PZD word of the telegram received via USS so that the converter will accept the process data as being valid. For this reason, the control word 1 must be transferred to the converter in the first PZD word.
Bit2 = 1
USS configuration
Change par. via 0 ... 15 P0927 (15)
USS baudrate 4 ... 12 P2010 [2] (6)
USS address 0 ... 31 P2011 [2] (0)
USS PZD length 0 ... 8 P2012 [2] (2)
USS PKW length 0 ... 127 P2013 [2] (127)
USS telegram T_off 0 ... 65535 [ms] P2014 [2] (0)
All parameters: Index = 1 => BOP link
1 2 3 4 5 6 7 8
External Interfaces
USS on BOP link, Receiving
2500_USSonBOP.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 2500 -

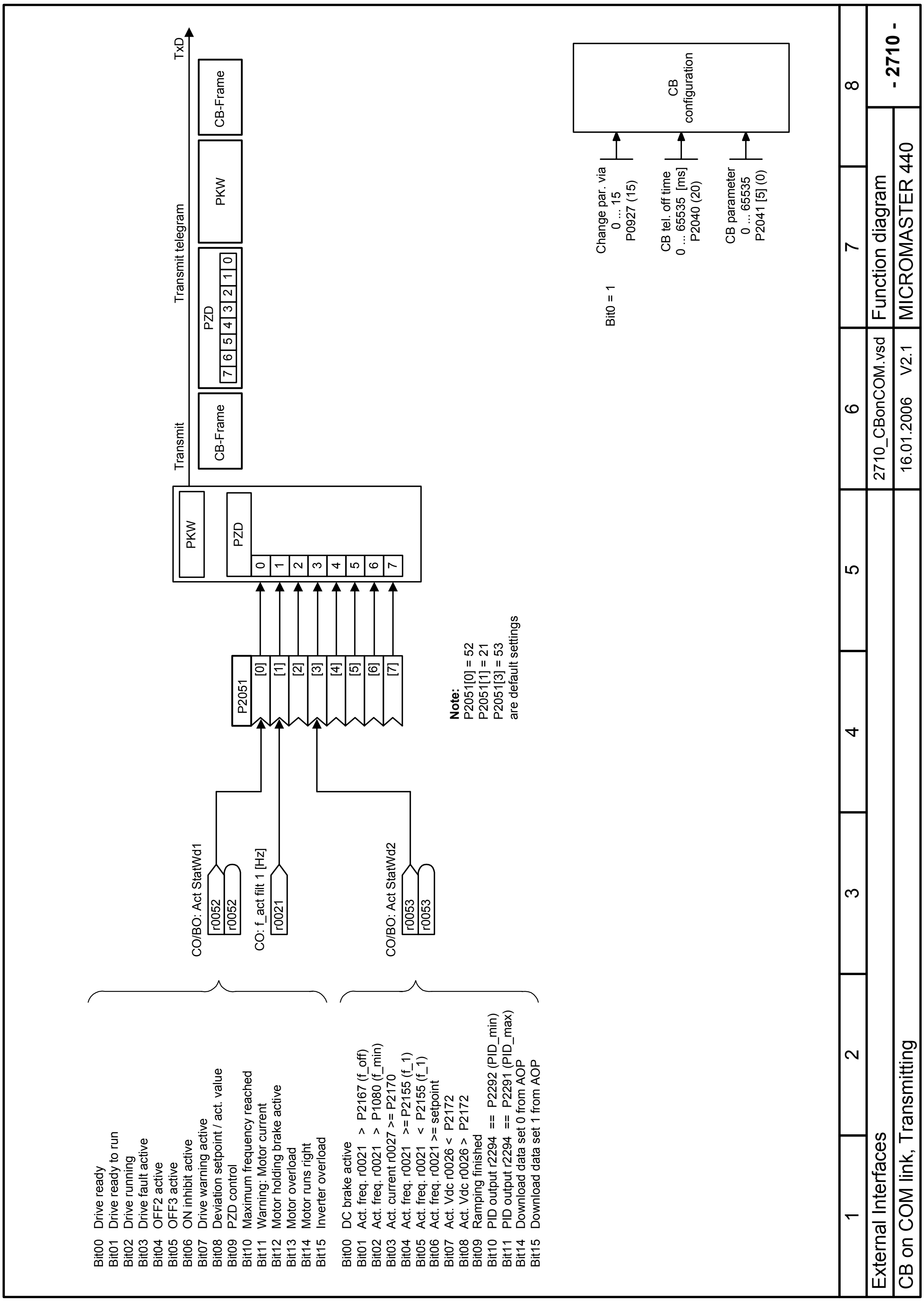

Bit00 Drive ready
Bit01 Drive ready to run
Bit02 Drive running
Bit03 Drive fault active
Bit04 OFF2 active
Bit05 OFF3 active
Bit06 ON inhibit active
Bit07 Drive warning active
Bit08 Deviation setpoint / act. value
Bit09 PZD control
Bit10 Maximum frequency reached
Bit11 Warning: Motor current
Bit12 Motor holding brake active
Bit13 Motor overload
Bit14 Motor runs right
Bit15 Inverter overload
Bit00 DC brake active
Bit01 Act. freq. r0021 > P2167 (f_off)
Bit02 Act. freq. r0021 > P1080 (f_min)
Bit03 Act. current r0027 >= P2170
Bit04 Act. freq. r0021 >= P2155 (f_1)
Bit05 Act. freq. r0021 < P2155 (f_1)
Bit06 Act. freq. r0021 >= setpoint
Bit07 Act. Vdc r0026 < P2172
Bit08 Act. Vdc r0026 > P2172
Bit09 Ramping finished
Bit10 PID output r2294 == P2292 (PID_min)
Bit11 PID output r2294 == P2291 (PID_max)
Bit14 Download data set 0 from AOP
Bit15 Download data set 1 from AOP
CO/BO: Act StatWd1
r0052
r0052
CO: f_act filt 1 [Hz]
r0021
CO/BO: Act StatWd2
r0053
r0053
P2016
[0]
[1]
[2]
[3]
[4]
[5]
[6]
[7]
Note:
P2016[0] = 52
P2016[1] = 21
P2016[3] = 53
are default settings
PKW
PZD
0
1
2
3
4
5
6
7
Transmit
Transmit telegram
TxD
BCC
PZD
7 6 5 4 3 2 1 0
PKW
ADR
LGE
STX
Bit2 = 1
Change par. via
0 ... 15
P0927 (15)
USS baudrate
4 ... 12
P2010 [2] (6)
USS address
0 ... 31
P2011 [2] (0)
USS PZD length
0 ... 8
P2012 [2] (2)
USS PKW length
0 ... 127
P2013 [2] (127)
USS telegram T_off
0 ... 65535 [ms]
P2014 [2] (0)
All parameters:
Index = 1
=> BOP link
USS
configuration
1
2
3
4
5
6
7
8
External Interfaces
USS on BOP link, Transmitting
2510_USSonBOP.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 2510 -

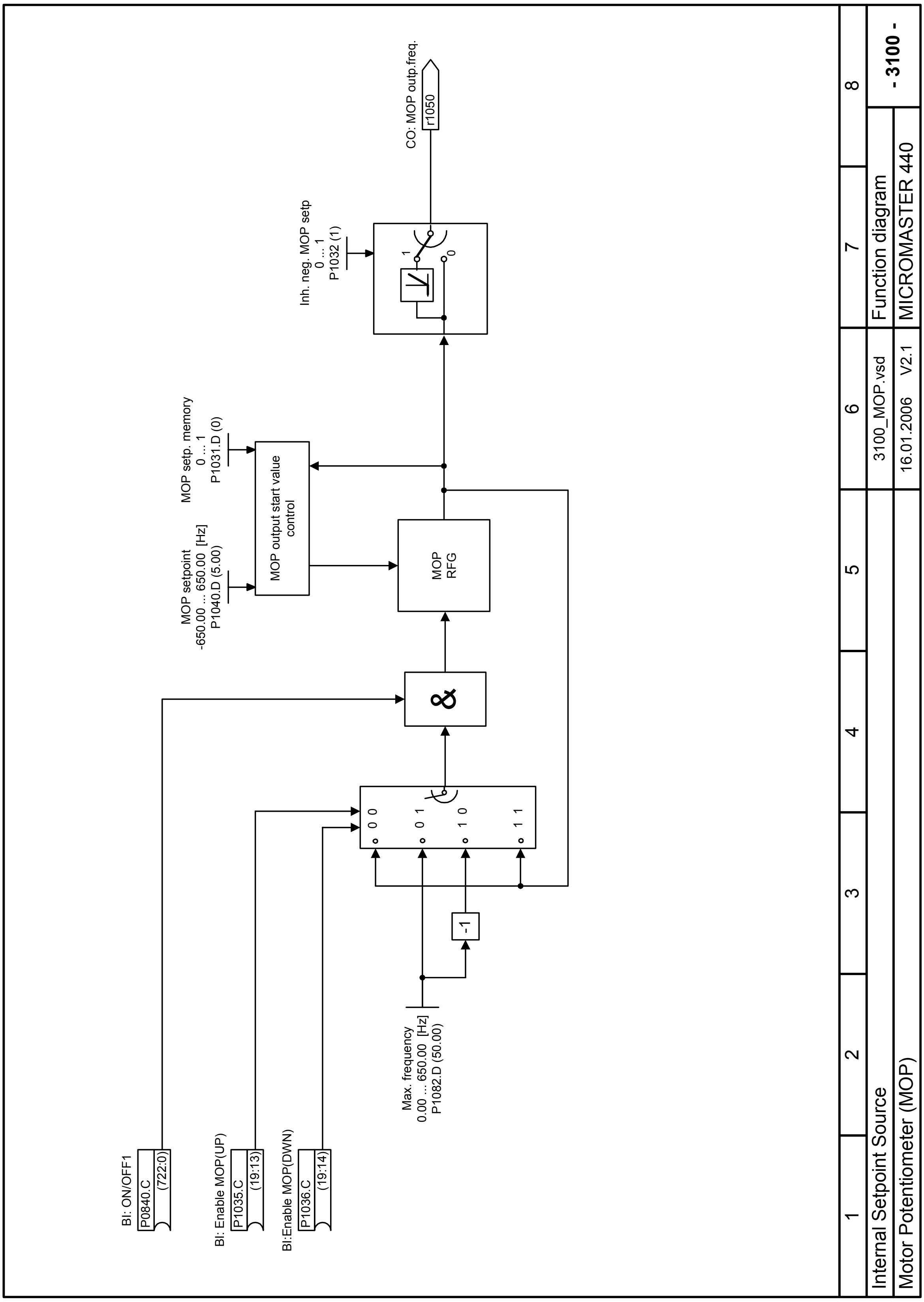


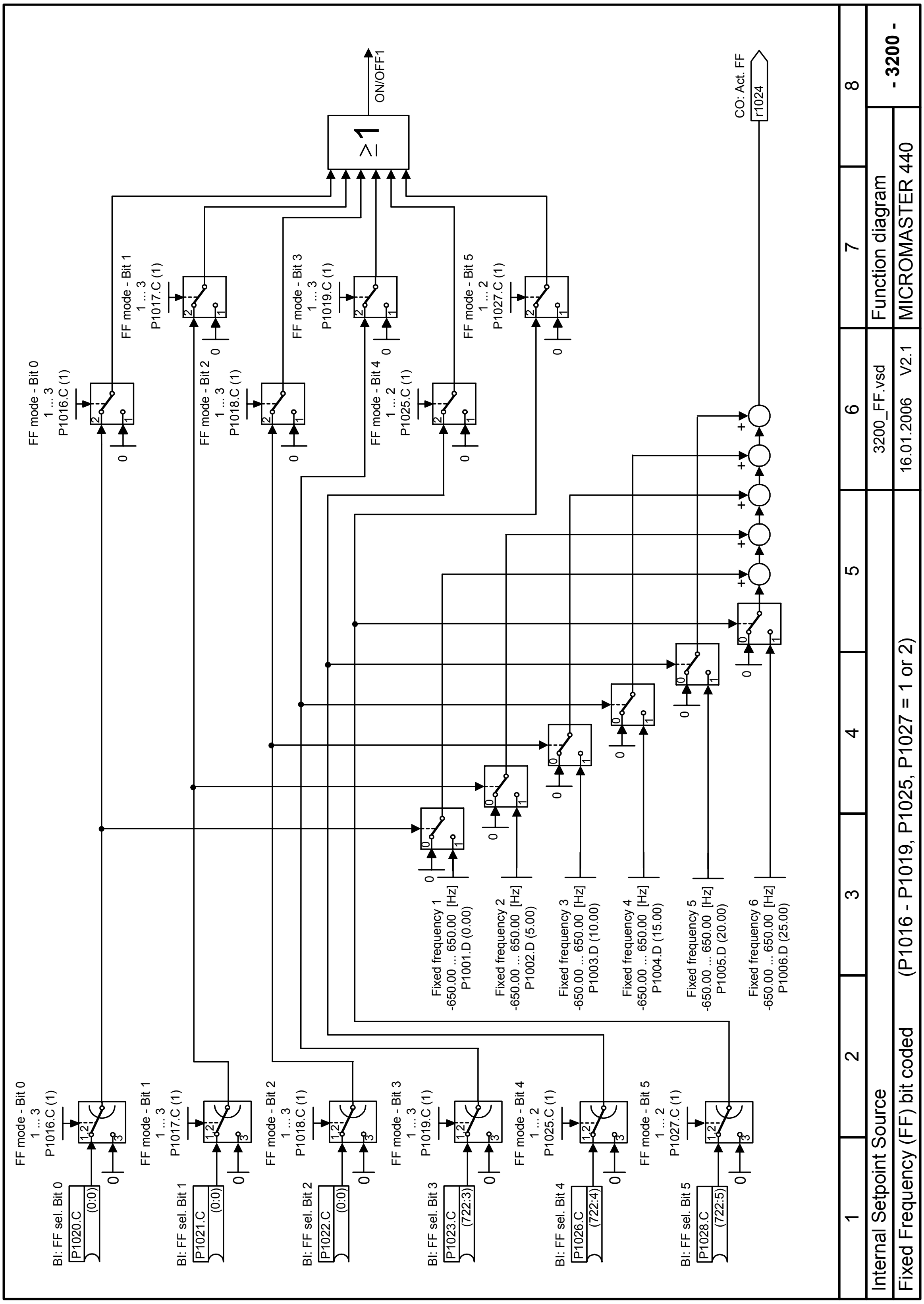
RxD
Receive telegram
Receive
BCC
PZD
7 6 5 4 3 2 1 0
PKW
ADR
LGE
STX
PKW
PZD
0 1 2 3 4 5 6 7
r2018
[0] [1] [2] [3] [4] [5] [6] [7]
BO: CtrlWd1 <- COM
r2036
BO: CtrlWd2 <- COM
r2037
Bit00 ON/OFF1
Bit01 OFF2: Electrical stop
Bit02 OFF3: Fast stop
Bit03 Pulse enable
Bit04 RFG enable
Bit05 RFG start
Bit06 Setpoint enable
Bit07 Fault acknowledge
Bit08 JOG right
Bit09 JOG left
Bit10 Control from PLC
Bit11 Reverse (setpoint inversion)
Bit13 Motor potentiometer MOP up
Bit14 Motor potentiometer MOP down
Bit15 CDS Bit 0 (Local/Remote)
Bit00 Fixed frequency Bit 0
Bit01 Fixed frequency Bit 1
Bit02 Fixed frequency Bit 2
Bit03 Fixed frequency Bit 3
Bit04 Drive data set (DDS) Bit 0
Bit05 Drive data set (DDS) Bit 1
Bit08 PID enabled
Bit09 DC brake enabled
Bit11 Droop
Bit12 Torque control
Bit13 External fault 1
Bit15 Command data set (CDS) Bit 1
Note:
Bit 10 must be set in the first PZD word of the telegram received via USS so that the converter will accept the process data as being valid. For this reason, the control word 1 must be transferred to the converter in the first PZD word.
Bit3 = 1
Change par. via 0 ... 15 P0927 (15)
USS baudrate 4 ... 12 P2010 [2] (6)
USS address 0 ... 31 P2011 [2] (0)
USS PZD length 0 ... 8 P2012 [2] (2)
USS PKW length 0 ... 127 P2013 [2] (127)
USS telegram T_off 0 ... 65535 [ms] P2014 [2] (0)
USS configuration
All parameters: Index = 0 => COM link
1 2 3 4 5 6 7 8
External Interfaces
USS on COM link, Receiving
2600_USSonCOM.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 2600 -

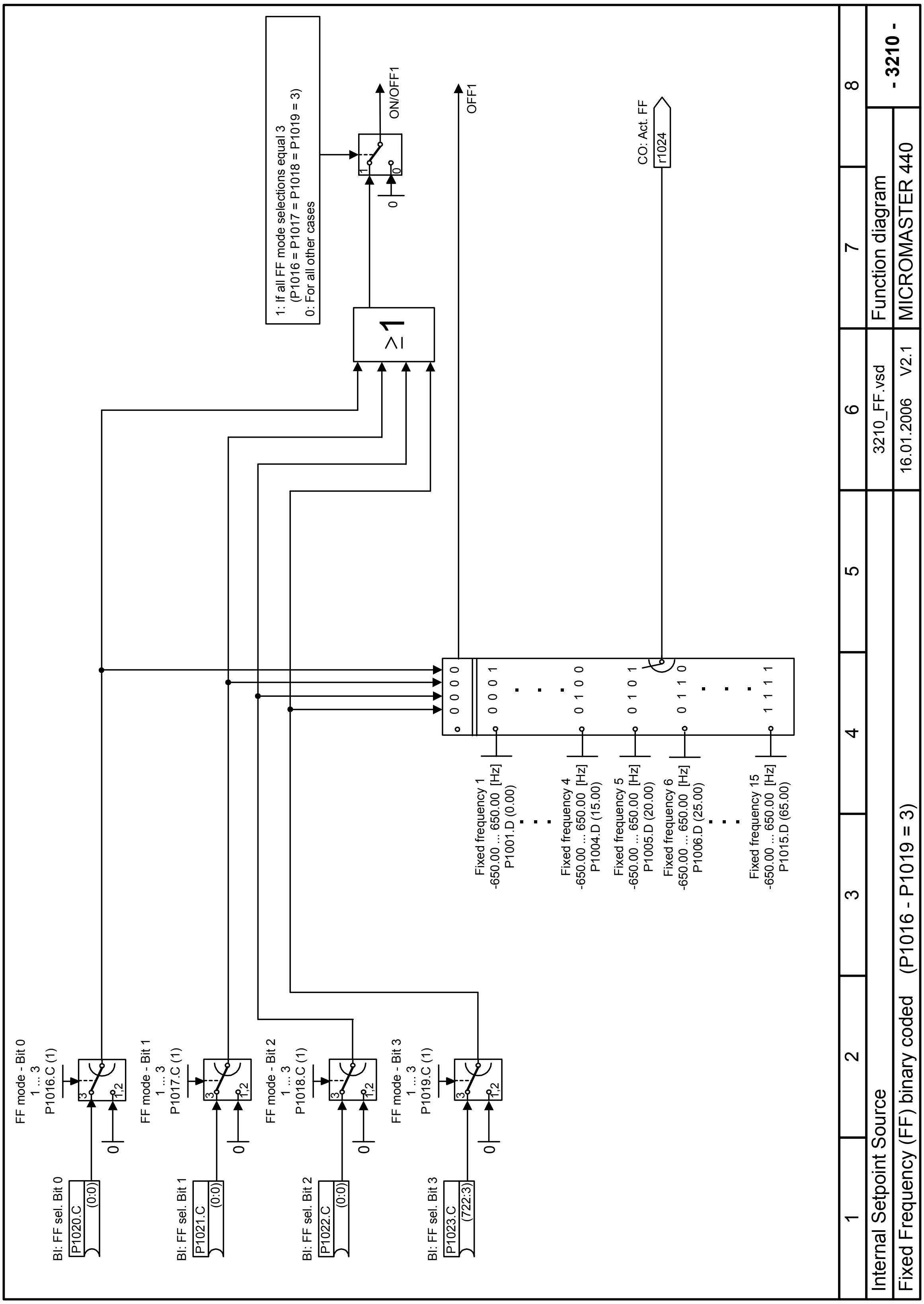

Bit00 Drive ready
Bit01 Drive ready to run
Bit02 Drive running
Bit03 Drive fault active
Bit04 OFF2 active
Bit05 OFF3 active
Bit06 ON inhibit active
Bit07 Drive warning active
Bit08 Deviation setpoint / act. value
Bit09 PZD control
Bit10 Maximum frequency reached
Bit11 Warning: Motor current
Bit12 Motor holding brake active
Bit13 Motor overload
Bit14 Motor runs right
Bit15 Inverter overload
Bit00 DC brake active
Bit01 Act. freq. r0021 > P2167 (f_off)
Bit02 Act. freq. r0021 > P1080 (f_min)
Bit03 Act. current r0027 >= P2170
Bit04 Act. freq. r0021 >= P2155 (f_1)
Bit05 Act. freq. r0021 < P2155 (f_1)
Bit06 Act. freq. r0021 >= setpoint
Bit07 Act. Vdc r0026 < P2172
Bit08 Act. Vdc r0026 > P2172
Bit09 Ramping finished
Bit10 PID output r2294 == P2292 (PID_min)
Bit11 PID output r2294 == P2291 (PID_max)
Bit14 Download data set 0 from AOP
Bit15 Download data set 1 from AOP
CO/BO: Act StatWd1
r0052
r0052
CO: f_act filt 1 [Hz]
r0021
CO/BO: Act StatWd2
r0053
r0053
P2019
[0] [1] [2] [3] [4] [5] [6] [7]
Note:
P2019[0] = 52
P2019[1] = 21
P2019[3] = 53
are default settings
PKW
PZD
0 1 2 3 4 5 6 7
Transmit
Transmit telegram
TxD
BCC
PZD
7 6 5 4 3 2 1 0
PKW
ADR
LGE
STX
Bit3 = 1
Change par. via
0 ... 15
P0927 (15)
USS baudrate
4 ... 12
P2010 [2] (6)
USS address
0 ... 31
P2011 [2] (0)
USS PZD length
0 ... 8
P2012 [2] (2)
USS PKW length
0 ... 127
P2013 [2] (127)
USS telegram T_off
0 ... 65535 [ms]
P2014 [2] (0)
All parameters:
Index = 0
=> COM link
USS
configuration
1 2 3 4 5 6 7 8
External Interfaces
USS on COM link, Transmitting
2610_USSonCOM.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 2610 -

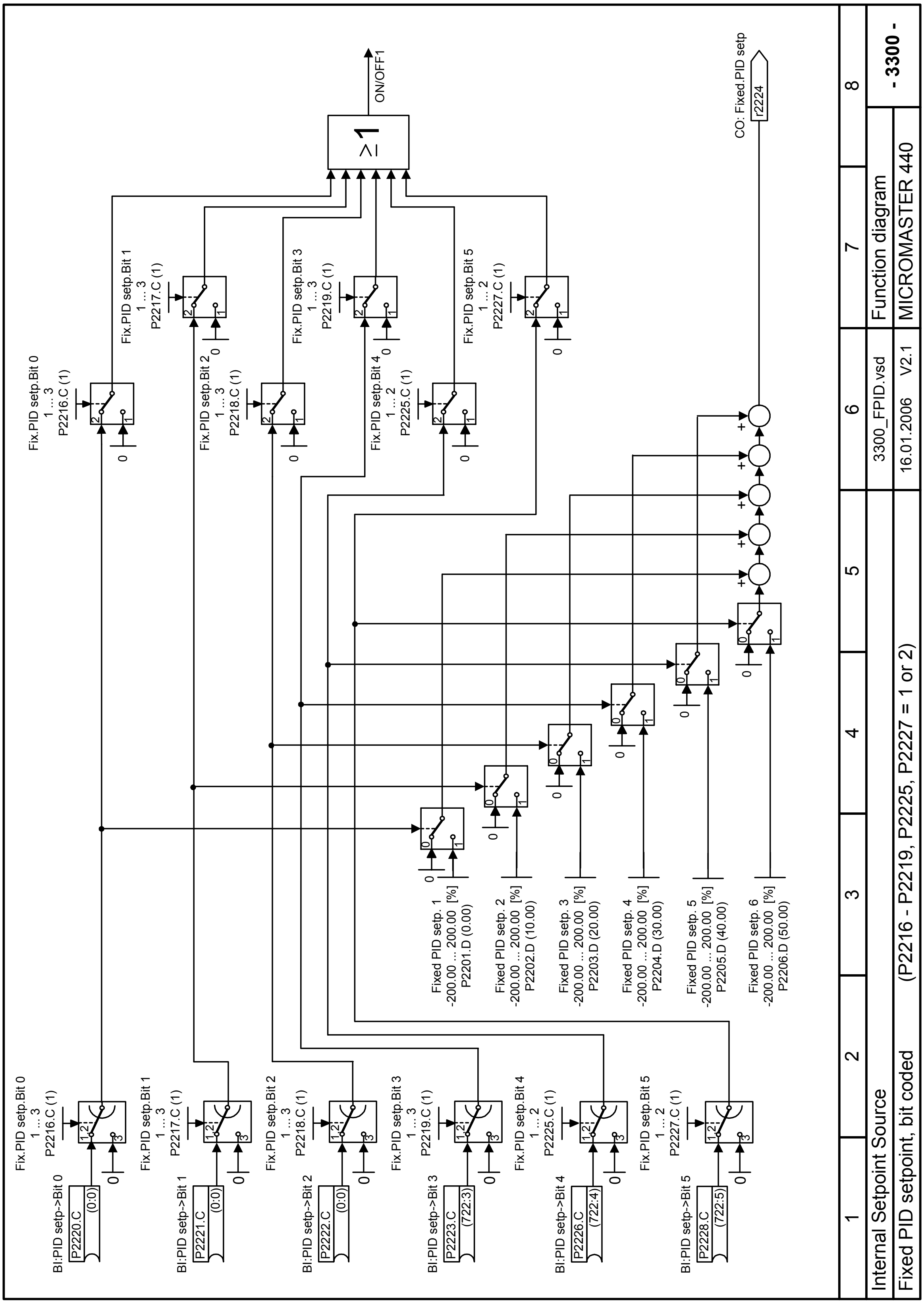

RxD
Receive telegram
Receive
CB-Frame
PZD
7 6 5 4 3 2 1 0
PKW
CB-Frame
PKW
PZD
0 1 2 3 4 5 6 7
r2050
[0] [1] [2] [3] [4] [5] [6] [7]
BO: CtrlWd1 <- CB
r2090
BO: CtrlWd2 <- CB
r2091
Bit00 ON/OFF1
Bit01 OFF2: Electrical stop
Bit02 OFF3: Fast stop
Bit03 Pulse enable
Bit04 RFG enable
Bit05 RFG start
Bit06 Setpoint enable
Bit07 Fault acknowledge
Bit08 JOG right
Bit09 JOG left
Bit10 Control from PLC
Bit11 Reverse (setpoint inversion)
Bit13 Motor potentiometer MOP up
Bit14 Motor potentiometer MOP down
Bit15 CDS Bit 0 (Local/Remote)
Bit00 Fixed frequency Bit 0
Bit01 Fixed frequency Bit 1
Bit02 Fixed frequency Bit 2
Bit03 Fixed frequency Bit 3
Bit04 Drive data set (DDS) Bit 0
Bit05 Drive data set (DDS) Bit 1
Bit08 PID enabled
Bit09 DC brake enabled
Bit11 Droop
Bit12 Torque control
Bit13 External fault 1
Bit15 Command data set (CDS) Bit 1
Bit0 = 1
Change par. via
0 ... 15
P0927 (15)
CB tel. off time
0 ... 65535 [ms]
P2040 (20)
CB parameter
0 ... 65535
P2041 [5] (0)
CB
configuration
Note:
Bit 10 must be set in the first PZD word of the
telegram received via USS so that the converter
will accept the process data as
being valid. For this reason, the control
word 1 must be transferred to the converter
in the first PZD word.
1 2 3 4 5 6 7 8
External Interfaces
CB on COM link, Receiving
2700_CBonCOM.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 2700 -

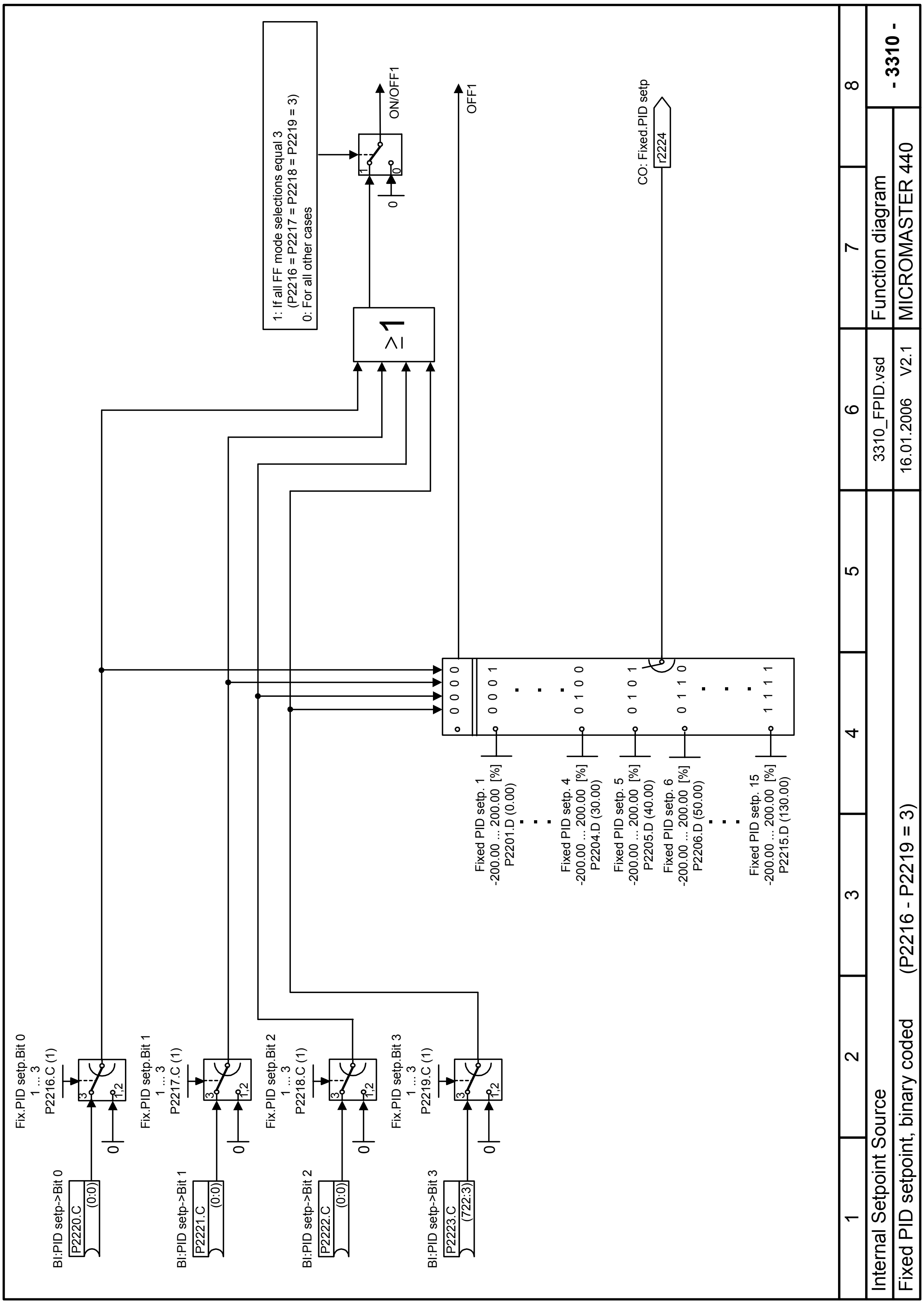

Bit00 Drive ready
Bit01 Drive ready to run
Bit02 Drive running
Bit03 Drive fault active
Bit04 OFF2 active
Bit05 OFF3 active
Bit06 ON inhibit active
Bit07 Drive warning active
Bit08 Deviation setpoint / act. value
Bit09 PZD control
Bit10 Maximum frequency reached
Bit11 Warning: Motor current
Bit12 Motor holding brake active
Bit13 Motor overload
Bit14 Motor runs right
Bit15 Inverter overload
Bit00 DC brake active
Bit01 Act. freq. r0021 > P2167 (f_off)
Bit02 Act. freq. r0021 > P1080 (f_min)
Bit03 Act. current r0027 >= P2170
Bit04 Act. freq. r0021 >= P2155 (f_1)
Bit05 Act. freq. r0021 < P2155 (f_1)
Bit06 Act. freq. r0021 >= setpoint
Bit07 Act. Vdc r0026 < P2172
Bit08 Act. Vdc r0026 > P2172
Bit09 Ramping finished
Bit10 PID output r2294 == P2292 (PID_min)
Bit11 PID output r2294 == P2291 (PID_max)
Bit14 Download data set 0 from AOP
Bit15 Download data set 1 from AOP
CO/BO: Act StatWd1
r0052
r0052
CO: f_act filt 1 [Hz]
r0021
CO/BO: Act StatWd2
r0053
r0053
P2051
[0]
[1]
[2]
[3]
[4]
[5]
[6]
[7]
Note:
P2051[0] = 52
P2051[1] = 21
P2051[3] = 53
are default settings
PKW
PZD
0 1 2 3 4 5 6 7
Transmit
Transmit telegram
TxD
CB-Frame
PZD
7 6 5 4 3 2 1 0
PKW
CB-Frame
Bit0 = 1
Change par. via
0 ... 15
P0927 (15)
CB tel. off time
0 ... 65535 [ms]
P2040 (20)
CB parameter
0 ... 65535
P2041 [5] (0)
CB
configuration
1 2 3 4 5 6 7 8
External Interfaces
CB on COM link, Transmitting
2710_CBonCOM.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 2710 -

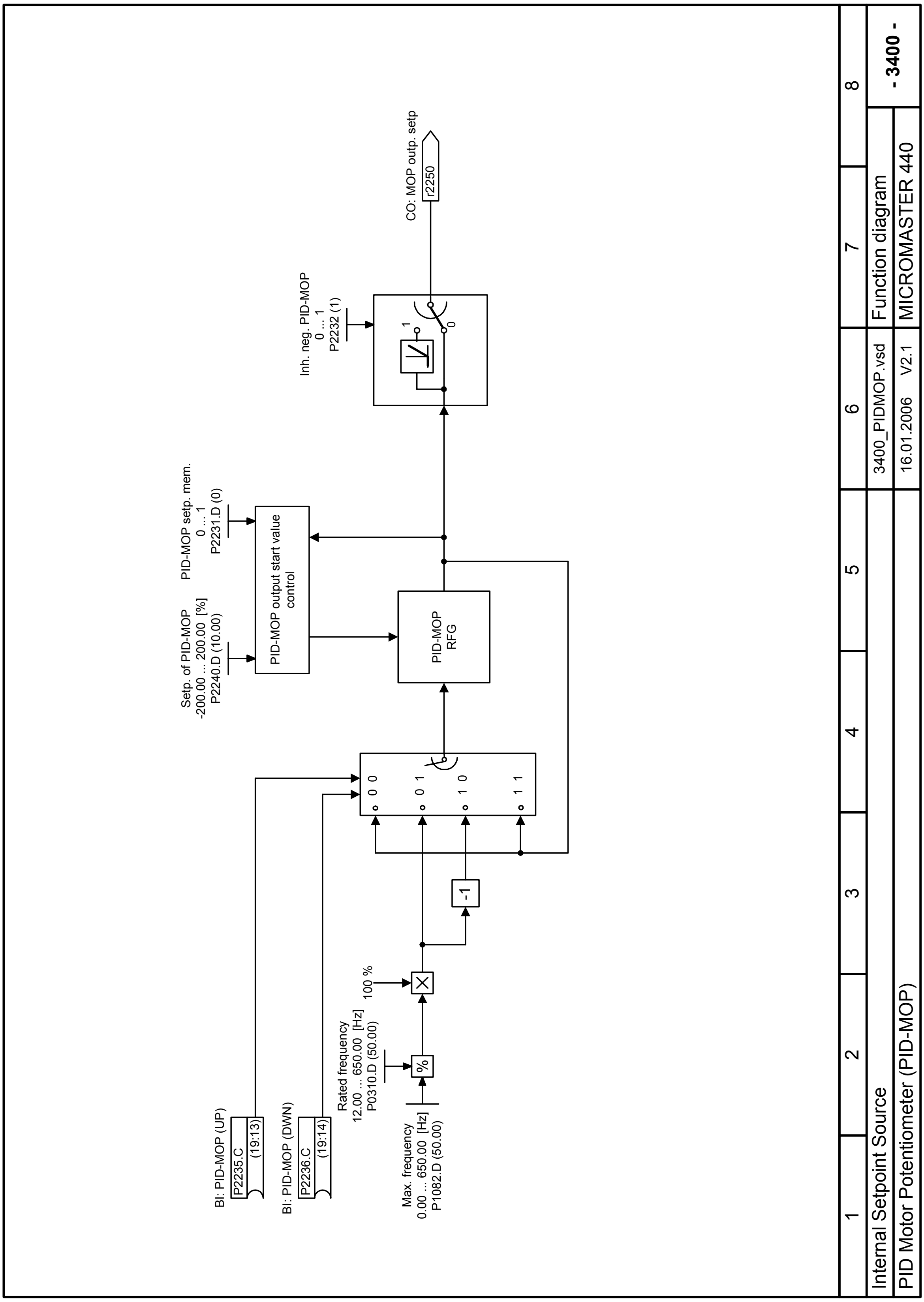

CO: MOP outp.freq.
r1050
Inh. neg. MOP setp
0 ... 1
P1032 (1)
1
0
MOP setp. memory
0 ... 1
P1031.D (0)
MOP setpoint
-650.00 ... 650.00 [Hz]
P1040.D (5.00)
MOP output start value control
MOP
RFG
&
0 0
0 1
1 0
1 1
-1
Max. frequency
0.00 ... 650.00 [Hz]
P1082.D (50.00)
BI: ON/OFF1
P0840.C
(722:0)
BI: Enable MOP(UP)
P1035.C
(19:13)
BI:Enable MOP(DWN)
P1036.C
(19:14)
1
2
3
4
5
6
7
8
Internal Setpoint Source
Motor Potentiometer (MOP)
3100_MOP.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 3100 -

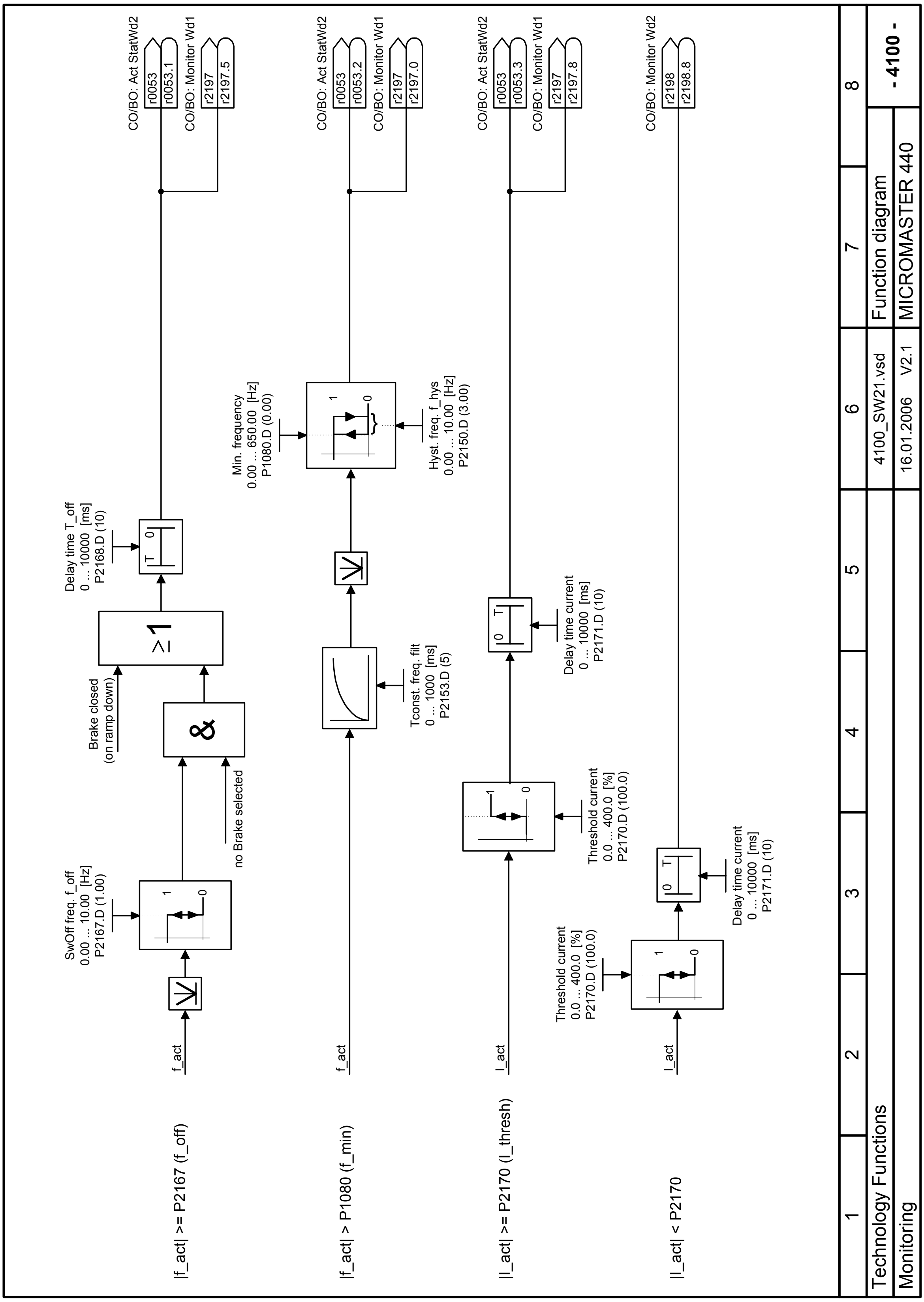

BI: FF sel. Bit 0
P1020.C (0:0)
BI: FF sel. Bit 1
P1021.C (0:0)
BI: FF sel. Bit 2
P1022.C (0:0)
BI: FF sel. Bit 3
P1023.C (722:3)
BI: FF sel. Bit 4
P1026.C (722:4)
BI: FF sel. Bit 5
P1028.C (722:5)
FF mode - Bit 0
1 ... 3
P1016.C (1)
FF mode - Bit 1
1 ... 3
P1017.C (1)
FF mode - Bit 2
1 ... 3
P1018.C (1)
FF mode - Bit 3
1 ... 3
P1019.C (1)
FF mode - Bit 4
1 ... 2
P1025.C (1)
FF mode - Bit 5
1 ... 2
P1027.C (1)
Fixed frequency 1
-650.00 ... 650.00 [Hz]
P1001.D (0.00)
Fixed frequency 2
-650.00 ... 650.00 [Hz]
P1002.D (5.00)
Fixed frequency 3
-650.00 ... 650.00 [Hz]
P1003.D (10.00)
Fixed frequency 4
-650.00 ... 650.00 [Hz]
P1004.D (15.00)
Fixed frequency 5
-650.00 ... 650.00 [Hz]
P1005.D (20.00)
Fixed frequency 6
-650.00 ... 650.00 [Hz]
P1006.D (25.00)
≥1
ON/OFF1
CO: Act. FF
r1024
1 2 3 4 5 6 7 8
Internal Setpoint Source
Fixed Frequency (FF) bit coded
(P1016 - P1019, P1025, P1027 = 1 or 2)
3200_FF.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 3200 -

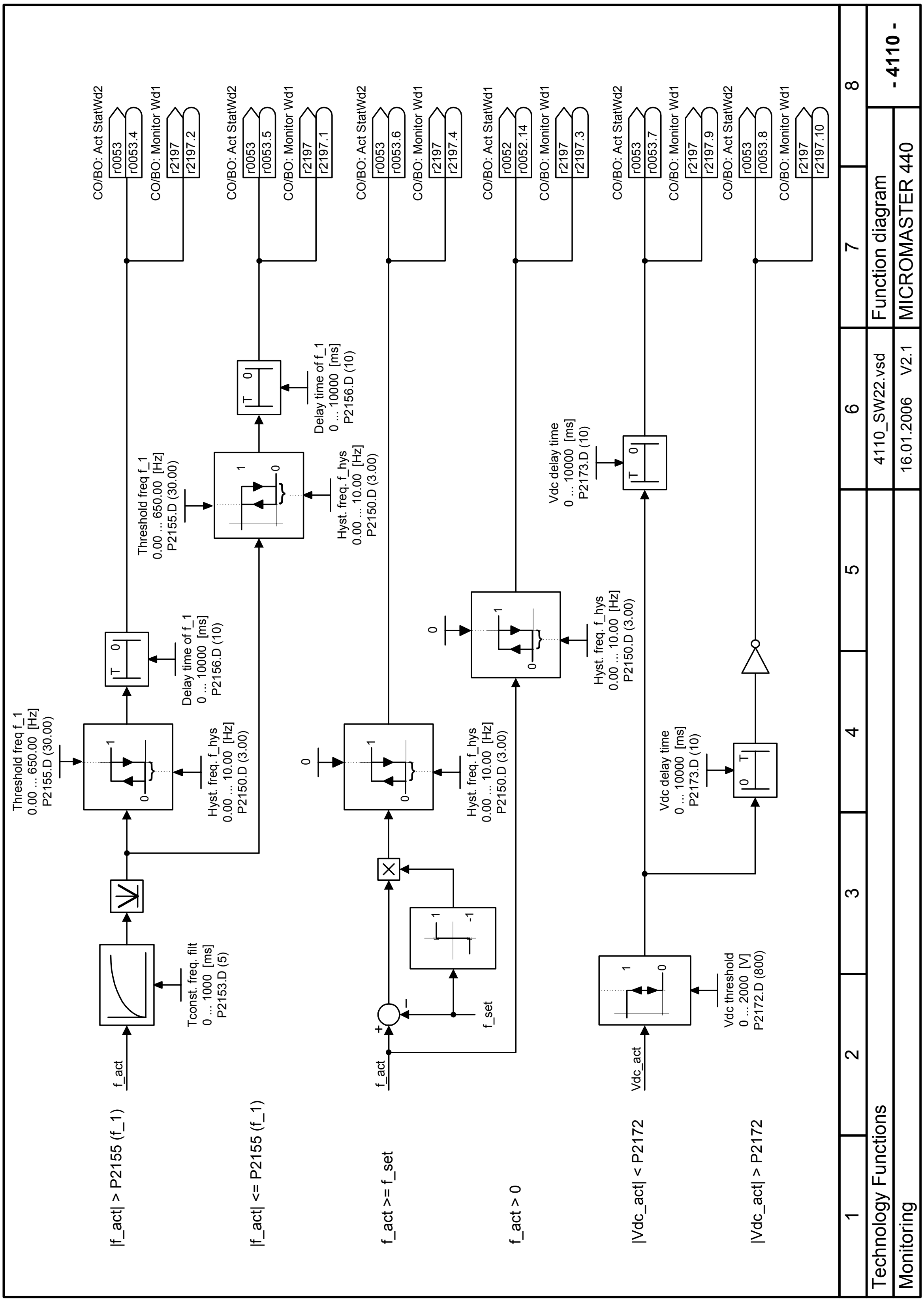

BI: FF sel. Bit 0
P1020.C
(0:0)
BI: FF sel. Bit 1
P1021.C
(0:0)
BI: FF sel. Bit 2
P1022.C
(0:0)
BI: FF sel. Bit 3
P1023.C
(722:3)
FF mode - Bit 0
1 ... 3
P1016.C (1)
FF mode - Bit 1
1 ... 3
P1017.C (1)
FF mode - Bit 2
1 ... 3
P1018.C (1)
FF mode - Bit 3
1 ... 3
P1019.C (1)
Fixed frequency 1
-650.00 ... 650.00 [Hz]
P1001.D (0.00)
Fixed frequency 4
-650.00 ... 650.00 [Hz]
P1004.D (15.00)
Fixed frequency 5
-650.00 ... 650.00 [Hz]
P1005.D (20.00)
Fixed frequency 6
-650.00 ... 650.00 [Hz]
P1006.D (25.00)
Fixed frequency 15
-650.00 ... 650.00 [Hz]
P1015.D (65.00)
0 0 0 0
0 0 0 1
0 1 0 0
0 1 0 1
0 1 1 0
1 1 1 1
≥1
1: If all FF mode selections equal 3
(P1016 = P1017 = P1018 = P1019 = 3)
0: For all other cases
ON/OFF1
OFF1
CO: Act. FF
r1024
1
2
3
4
5
6
7
8
Internal Setpoint Source
Fixed Frequency (FF) binary coded (P1016 - P1019 = 3)
3210_FF.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 3210 -

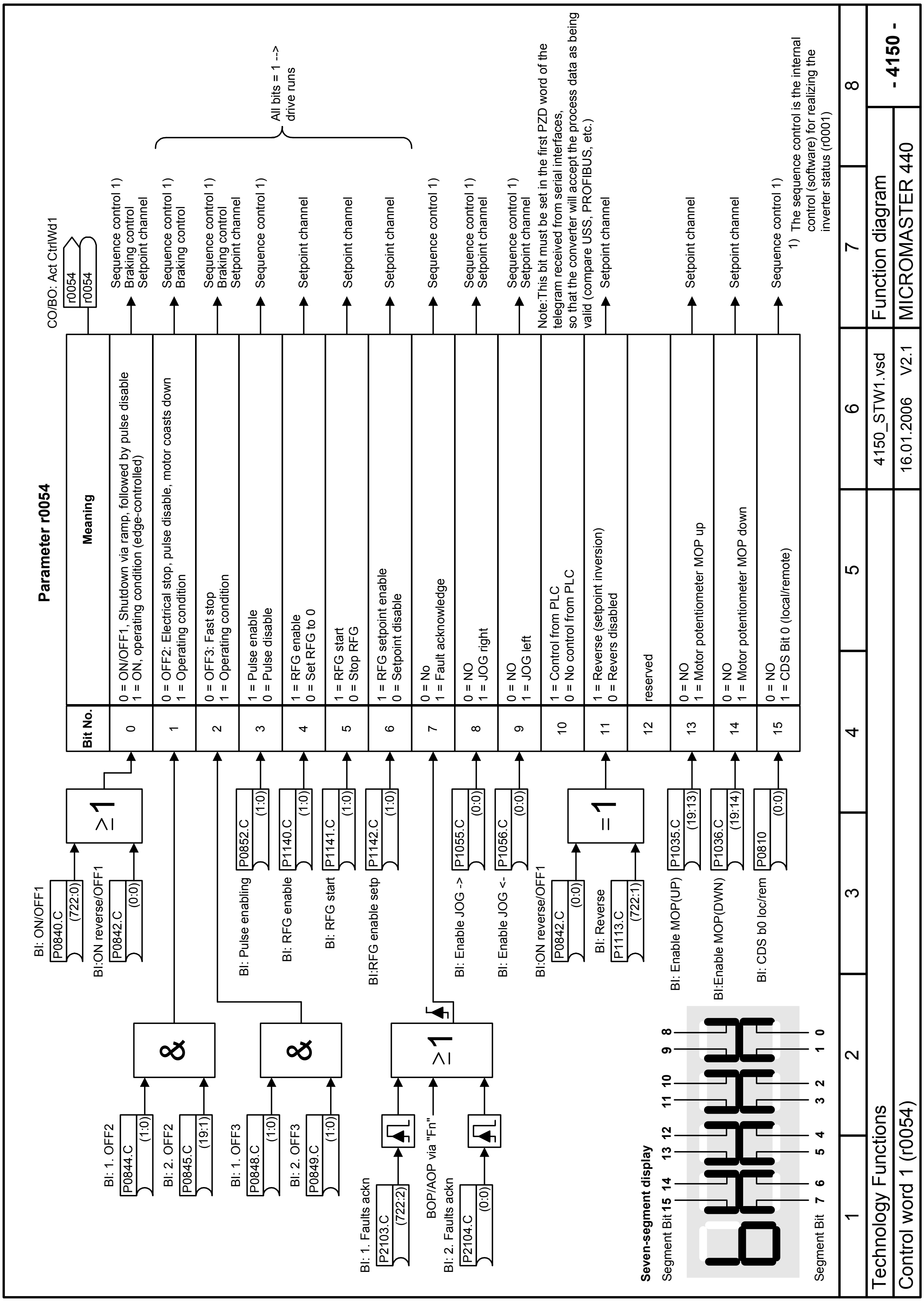

Internal Setpoint Source
Fixed PID setpoint, bit coded
(P2216 - P2219, P2225, P2227 = 1 or 2)
3300_FPID.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 3300 -
1
2
3
4
5
6
7
8
BI:PID setp->Bit 0
P2220.C
(0:0)
BI:PID setp->Bit 1
P2221.C
(0:0)
BI:PID setp->Bit 2
P2222.C
(0:0)
BI:PID setp->Bit 3
P2223.C
(722:3)
BI:PID setp->Bit 4
P2226.C
(722:4)
BI:PID setp->Bit 5
P2228.C
(722:5)
Fix.PID setp.Bit 0
1 ... 3
P2216.C (1)
Fix.PID setp.Bit 1
1 ... 3
P2217.C (1)
Fix.PID setp.Bit 2
1 ... 3
P2218.C (1)
Fix.PID setp.Bit 3
1 ... 3
P2219.C (1)
Fix.PID setp.Bit 4
1 ... 2
P2225.C (1)
Fix.PID setp.Bit 5
1 ... 2
P2227.C (1)
Fixed PID setp. 1
-200.00 ... 200.00 [%]
P2201.D (0.00)
Fixed PID setp. 2
-200.00 ... 200.00 [%]
P2202.D (10.00)
Fixed PID setp. 3
-200.00 ... 200.00 [%]
P2203.D (20.00)
Fixed PID setp. 4
-200.00 ... 200.00 [%]
P2204.D (30.00)
Fixed PID setp. 5
-200.00 ... 200.00 [%]
P2205.D (40.00)
Fixed PID setp. 6
-200.00 ... 200.00 [%]
P2206.D (50.00)
≥1
ON/OFF1
CO: Fixed.PID setp
r2224


BI:PID setp->Bit 0
P2220.C
(0:0)
BI:PID setp->Bit 1
P2221.C
(0:0)
BI:PID setp->Bit 2
P2222.C
(0:0)
BI:PID setp->Bit 3
P2223.C
(722:3)
Fix.PID setp.Bit 0
1 ... 3
P2216.C (1)
Fix.PID setp.Bit 1
1 ... 3
P2217.C (1)
Fix.PID setp.Bit 2
1 ... 3
P2218.C (1)
Fix.PID setp.Bit 3
1 ... 3
P2219.C (1)
Fixed PID setp. 1
-200.00 ... 200.00 [%]
P2201.D (0.00)
Fixed PID setp. 4
-200.00 ... 200.00 [%]
P2204.D (30.00)
Fixed PID setp. 5
-200.00 ... 200.00 [%]
P2205.D (40.00)
Fixed PID setp. 6
-200.00 ... 200.00 [%]
P2206.D (50.00)
Fixed PID setp. 15
-200.00 ... 200.00 [%]
P2215.D (130.00)
1: If all FF mode selections equal 3
(P2216 = P2217 = P2218 = P2219 = 3)
0: For all other cases
≥1
ON/OFF1
OFF1
CO: Fixed.PID setp
r2224
Internal Setpoint Source
Fixed PID setpoint, binary coded (P2216 - P2219 = 3)
3310_FPID.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 3310 -

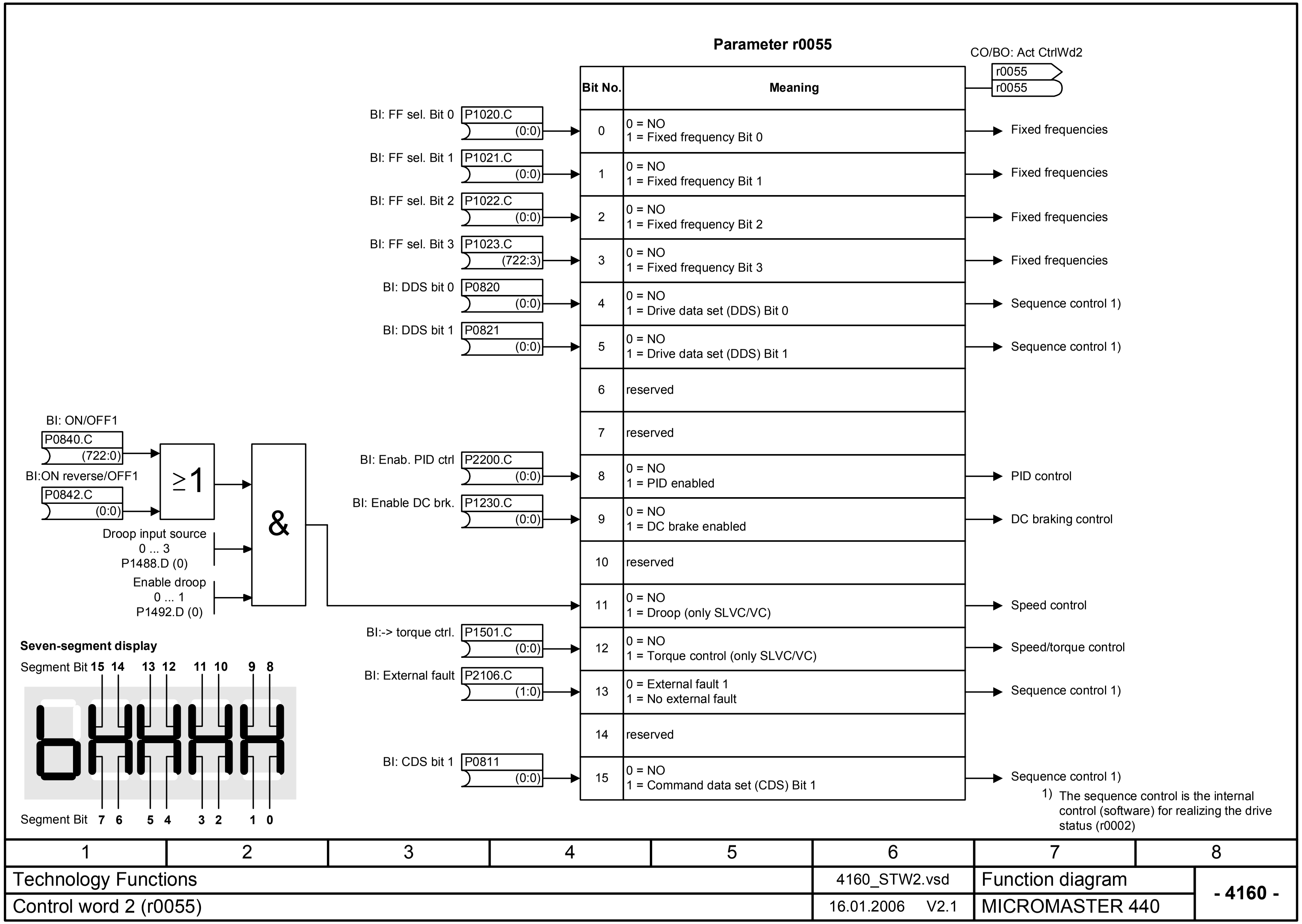

BI: PID-MOP (UP)
P2235.C
(19:13)
BI: PID-MOP (DWN)
P2236.C
(19:14)
Max. frequency
0.00 ... 650.00 [Hz]
P1082.D (50.00)
Rated frequency
12.00 ... 650.00 [Hz]
P0310.D (50.00)
%
100 %
-1
0 0
0 1
1 0
1 1
Setp. of PID-MOP
-200.00 ... 200.00 [%]
P2240.D (10.00)
PID-MOP setp. mem.
0 ... 1
P2231.D (0)
PID-MOP output start value control
PID-MOP
RFG
Inh. neg. PID-MOP
0 ... 1
P2232 (1)
1
0
CO: MOP outp. setp
r2250
1
2
3
4
5
6
7
8
Internal Setpoint Source
PID Motor Potentiometer (PID-MOP)
3400_PIDMOP.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 3400 -


|f_act| >= P2167 (f_off)
f_act
SwOff freq. f_off
0.00 ... 10.00 [Hz]
P2167.D (1.00)
no Brake selected
&
Brake closed
(on ramp down)
≥1
Delay time T_off
0 ... 10000 [ms]
P2168.D (10)
CO/BO: Act StatWd2
r0053
r0053.1
CO/BO: Monitor Wd1
r2197
r2197.5
|f_act| > P1080 (f_min)
f_act
Tconst. freq. filt
0 ... 1000 [ms]
P2153.D (5)
Min. frequency
0.00 ... 650.00 [Hz]
P1080.D (0.00)
Hyst. freq. f_hys
0.00 ... 10.00 [Hz]
P2150.D (3.00)
CO/BO: Act StatWd2
r0053
r0053.2
CO/BO: Monitor Wd1
r2197
r2197.0
|I_act| >= P2170 (I_thresh)
I_act
Threshold current
0.0 ... 400.0 [%]
P2170.D (100.0)
Delay time current
0 ... 10000 [ms]
P2171.D (10)
CO/BO: Act StatWd2
r0053
r0053.3
CO/BO: Monitor Wd1
r2197
r2197.8
|I_act| < P2170
I_act
Threshold current
0.0 ... 400.0 [%]
P2170.D (100.0)
Delay time current
0 ... 10000 [ms]
P2171.D (10)
CO/BO: Monitor Wd2
r2198
r2198.8
1 2 3 4 5 6 7 8
Technology Functions
Monitoring
4100_SW21.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 4100 -


|f_act| > P2155 (f_1)
f_act
Tconst. freq. filt
0 ... 1000 [ms]
P2153.D (5)
Threshold freq f_1
0.00 ... 650.00 [Hz]
P2155.D (30.00)
Hyst. freq. f_hys
0.00 ... 10.00 [Hz]
P2150.D (3.00)
Delay time of f_1
0 ... 10000 [ms]
P2156.D (10)
CO/BO: Act StatWd2
r0053
r0053.4
CO/BO: Monitor Wd1
r2197
r2197.2
|f_act| <= P2155 (f_1)
Threshold freq f_1
0.00 ... 650.00 [Hz]
P2155.D (30.00)
Hyst. freq. f_hys
0.00 ... 10.00 [Hz]
P2150.D (3.00)
Delay time of f_1
0 ... 10000 [ms]
P2156.D (10)
CO/BO: Act StatWd2
r0053
r0053.5
CO/BO: Monitor Wd1
r2197
r2197.1
f_act >= f_set
f_act
f_set
Hyst. freq. f_hys
0.00 ... 10.00 [Hz]
P2150.D (3.00)
CO/BO: Act StatWd2
r0053
r0053.6
CO/BO: Monitor Wd1
r2197
r2197.4
f_act > 0
Hyst. freq. f_hys
0.00 ... 10.00 [Hz]
P2150.D (3.00)
CO/BO: Act StatWd1
r0052
r0052.14
CO/BO: Monitor Wd1
r2197
r2197.3
|Vdc_act| < P2172
Vdc_act
Vdc threshold
0 ... 2000 [V]
P2172.D (800)
Vdc delay time
0 ... 10000 [ms]
P2173.D (10)
CO/BO: Act StatWd2
r0053
r0053.7
CO/BO: Monitor Wd1
r2197
r2197.9
|Vdc_act| > P2172
Vdc delay time
0 ... 10000 [ms]
P2173.D (10)
CO/BO: Act StatWd2
r0053
r0053.8
CO/BO: Monitor Wd1
r2197
r2197.10
1 2 3 4 5 6 7 8
Technology Functions
Monitoring
4110_SW22.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 4110 -



Bit No.	Meaning	Destination
0	0 = ON/OFF1, Shutdown via ramp, followed by pulse disable 1 = ON, operating condition (edge-controlled)	Sequence control 1) Braking control Setpoint channel
1	0 = OFF2: Electrical stop, pulse disable, motor coasts down 1 = Operating condition	Sequence control 1) Braking control
2	0 = OFF3: Fast stop 1 = Operating condition	Sequence control 1) Braking control Setpoint channel
3	1 = Pulse enable 0 = Pulse disable	Sequence control 1)
4	1 = RFG enable 0 = Set RFG to 0	Setpoint channel
5	1 = RFG start 0 = Stop RFG	Setpoint channel
6	1 = RFG setpoint enable 0 = Setpoint disable	Setpoint channel
7	0 = No 1 = Fault acknowledge	Sequence control 1)
8	0 = NO 1 = JOG right	Sequence control 1) Setpoint channel
9	0 = NO 1 = JOG left	Sequence control 1) Setpoint channel
10	1 = Control from PLC 0 = No control from PLC	Note:This bit must be set in the first PZD word of the telegram received from serial interfaces, so that the converter will accept the process data as being valid (compare USS, PROFIBUS, etc.)
11	1 = Reverse (setpoint inversion) 0 = Revers disabled	Setpoint channel
12	reserved	
13	0 = NO 1 = Motor potentiometer MOP up	Setpoint channel
14	0 = NO 1 = Motor potentiometer MOP down	Setpoint channel
15	0 = NO 1 = CDS Bit 0 (local/remote)	Sequence control 1)


Parameter r0055
CO/BO: Act CtrlWd2
r0055
r0055
Bit No.
Meaning
BI: FF sel. Bit 0
P1020.C
(0:0)
0
0 = NO
1 = Fixed frequency Bit 0
Fixed frequencies
BI: FF sel. Bit 1
P1021.C
(0:0)
1
0 = NO
1 = Fixed frequency Bit 1
Fixed frequencies
BI: FF sel. Bit 2
P1022.C
(0:0)
2
0 = NO
1 = Fixed frequency Bit 2
Fixed frequencies
BI: FF sel. Bit 3
P1023.C
(722:3)
3
0 = NO
1 = Fixed frequency Bit 3
Fixed frequencies
BI: DDS bit 0
P0820
(0:0)
4
0 = NO
1 = Drive data set (DDS) Bit 0
Sequence control 1)
BI: DDS bit 1
P0821
(0:0)
5
0 = NO
1 = Drive data set (DDS) Bit 1
Sequence control 1)
6
reserved
7
reserved
BI: Enab. PID ctrl
P2200.C
(0:0)
8
0 = NO
1 = PID enabled
PID control
BI: Enable DC brk.
P1230.C
(0:0)
9
0 = NO
1 = DC brake enabled
DC braking control
10
reserved
11
0 = NO
1 = Droop (only SLVC/VC)
Speed control
BI:-> torque ctrl.
P1501.C
(0:0)
12
0 = NO
1 = Torque control (only SLVC/VC)
Speed/torque control
BI: External fault
P2106.C
(1:0)
13
0 = External fault 1
1 = No external fault
Sequence control 1)
14
reserved
BI: CDS bit 1
P0811
(0:0)
15
0 = NO
1 = Command data set (CDS) Bit 1
Sequence control 1)
BI: ON/OFF1
P0840.C
(722:0)
BI:ON reverse/OFF1
P0842.C
(0:0)
≥1
&
Droop input source
0 ... 3
P1488.D (0)
Enable droop
0 ... 1
P1492.D (0)
Seven-segment display
Segment Bit 15 14 13 12 11 10 9 8
Segment Bit 7 6 5 4 3 2 1 0
1) The sequence control is the internal control (software) for realizing the drive status (r0002)
1
2
3
4
5
6
7
8
Technology Functions
Control word 2 (r0055)
4160_STW2.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 4160 -

Parameter r0052

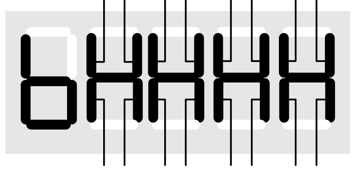
Source	Bit No.	Meaning
Sequence control 1)	0	1 = Drive ready 0 = Drive not ready
Sequence control 1)	1	1 = Drive ready to run (DC link loaded, pulses disabled) 0 = Drive not ready to run
Sequence control 1)	2	1 = Drive running (voltage at output terminals) 0 = Pulses disabled
Sequence control 1)	3	1 = Drive fault active (pulses disabled) 0 = No fault
Sequence control 1)	4	0 = OFF2 active 1 = No OFF2
Sequence control 1)	5	0 = OFF3 active 1 = No OFF3
Sequence control 1)	6	1 = ON inhibit active 0 = No On inhibit (possible to switch on)
Alarm processing	7	1 = Drive warning active 0 = No warning
Messages	8	0 = Deviation setpoint / act. value 1 = No deviation setpoint / act. Value
Sequence control 1)	9	1 = PZD control (always 1)
Messages	10	1 = Maximum frequency reached 0 = Maximum frequency not reached
Messages	11	0 = Warning: Motor current limit 1 = Motor current limit not reached
Braking control	12	1 = Motor holding brake active 0 = Motor holding brake not active
Messages	13	0 = Motor overload 1 = No Motor overload
Messages	14	1 = Motor runs right 0 = Motor does not run right
Messages	15	0 = Inverter overload 1 = No inverter overload

CO/BO: Act StatWd1
r0052
r0052

Bit 3 → 1 → r0052 / r0052.03 → P0731..P0733 (x.x)

Signal "Fault active" is inverted by MICROMASTER if connected to a digital output which means that the relay will be in the de-energised state.

Seven-segment display



1) The sequence control is the internal control (software) for realizing the drive status (r0002)

1	2	3	4	5	6	7	8
Technology Functions					4170_ZSW1.vsd	Function diagram	- 4170 -
Status word 1 (r0052)					16.01.2006 V2.1	MICROMASTER 440	

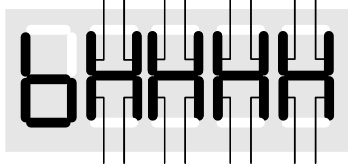
Parameter r0053

CO/BO: Act StatWd2
r0053
r0053

Source	Bit No.	Meaning
Braking control	0	1 = DC brake active 0 = DC brake not active
Alarm processing	1	1 = f_act > P2167 (f_off)
Messages	2	1 = f_act >= P1080 (f_min)
Alarm processing	3	1 = Act. current r0027 >= P2170
Messages	4	1 = f_act > P2155 (f_1)
Messages	5	1 = f_act <= P2155 (f_1)
Messages	6	1 = f_act >= setpoint
Messages	7	1 = Act. Vdc r0026 < P2172
Alarm processing	8	1 = Act. Vdc r0026 > P2172
Sequence control 1)	9	1 = Ramping finished
Messages	10	1 = PID output r2294 == P2292 (PID_min)
Messages	11	1 = PID output r2294 == P2291 (PID_max)
	12	reserved
	13	reserved
Sequence control 1)	14	Download data set 0 from AOP
Sequence control 1)	15	Download data set 1 from AOP

Seven-segment display

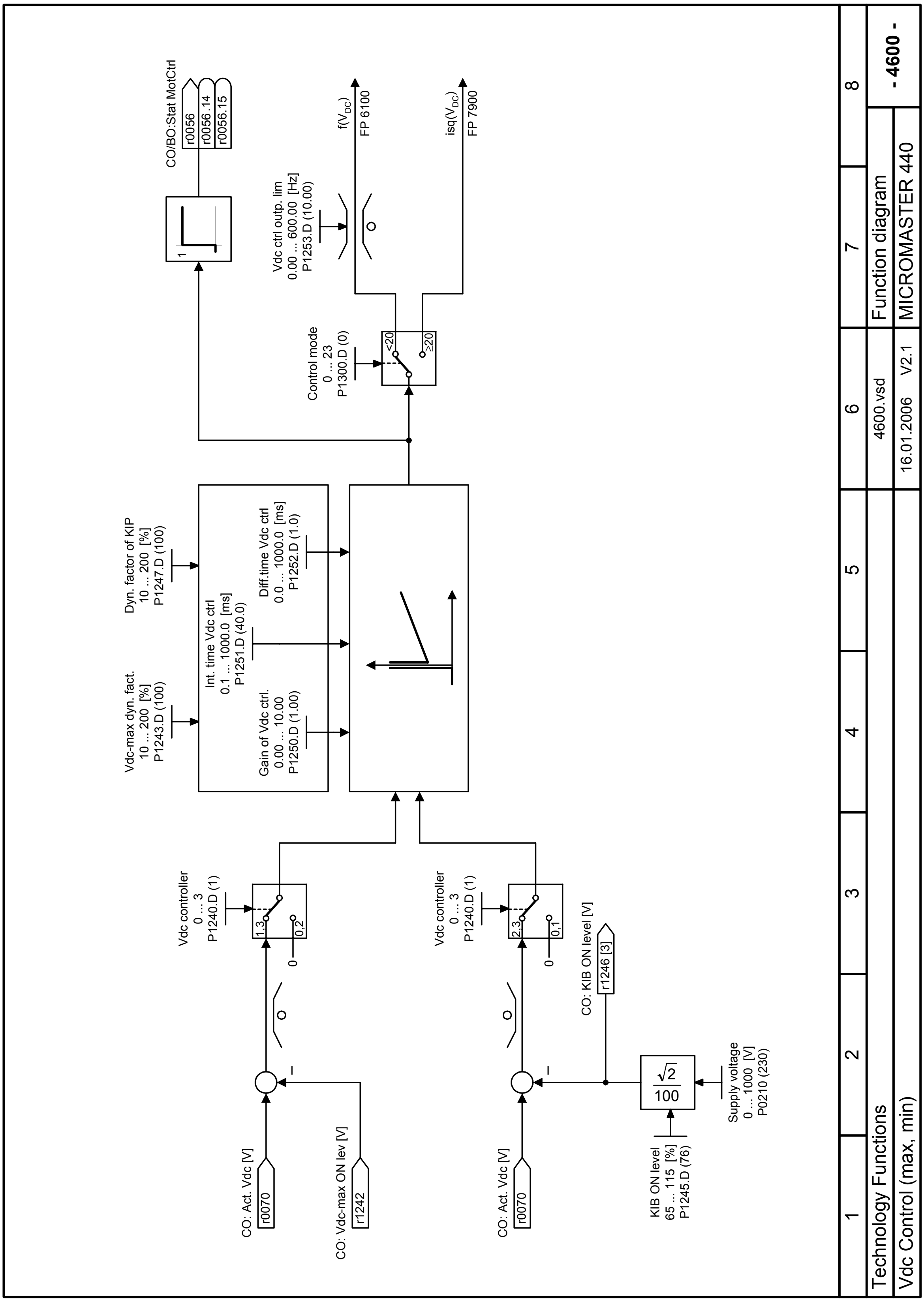
Segment Bit 15 14 13 12 11 10 9 8

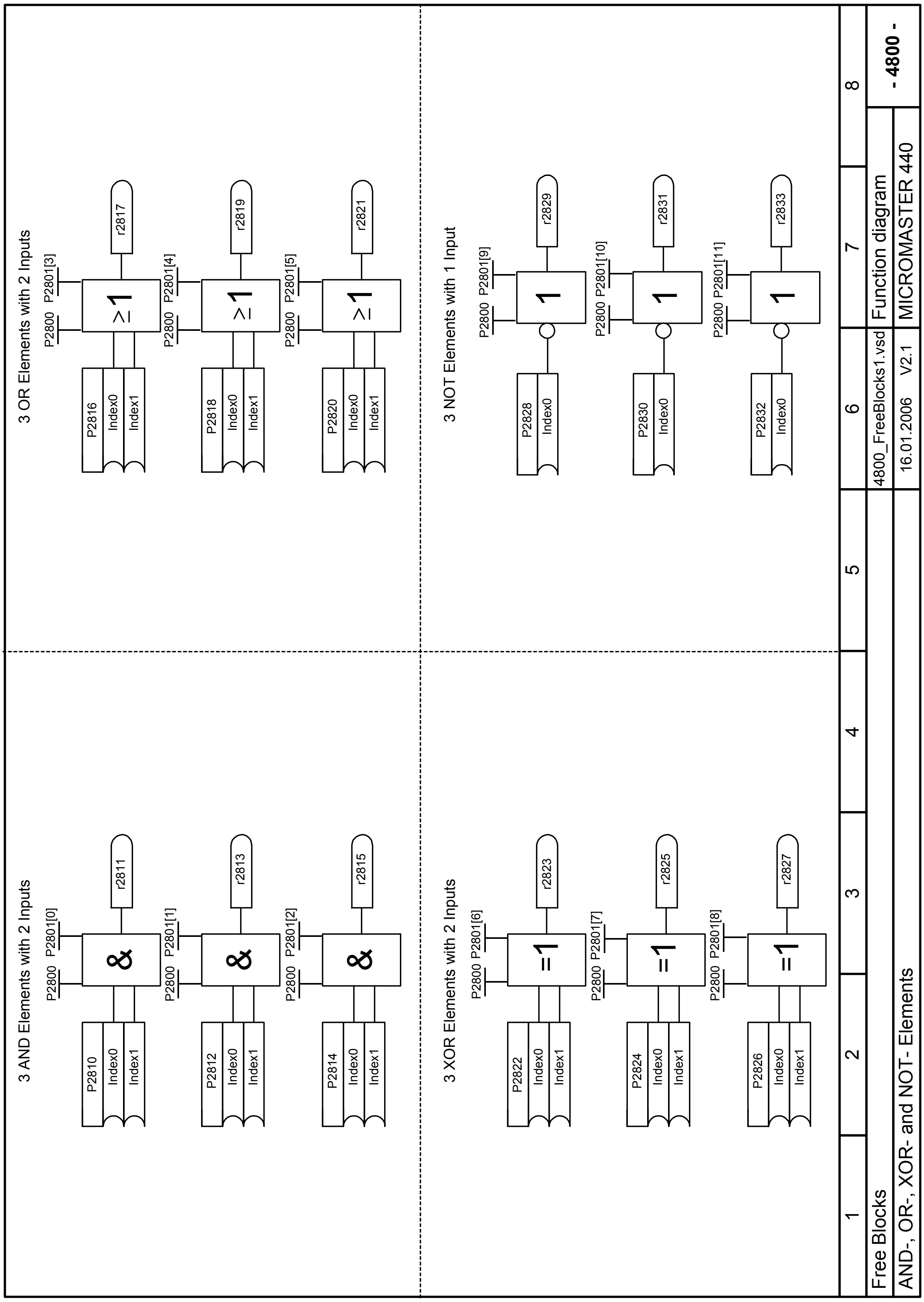


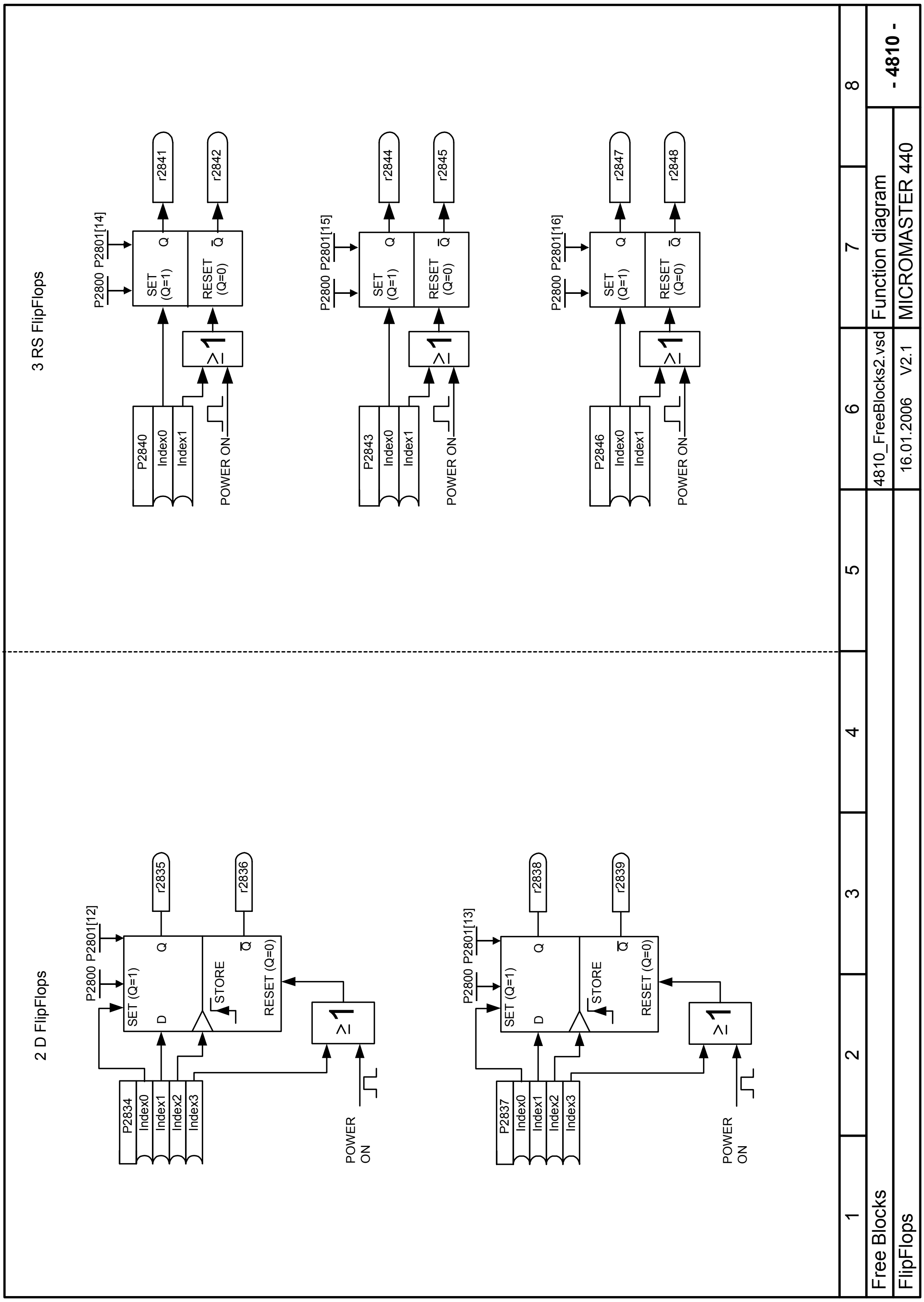
Segment Bit 7 6 5 4 3 2 1 0

1) The sequence control is the internal control (software) for realizing the drive status (r0002)

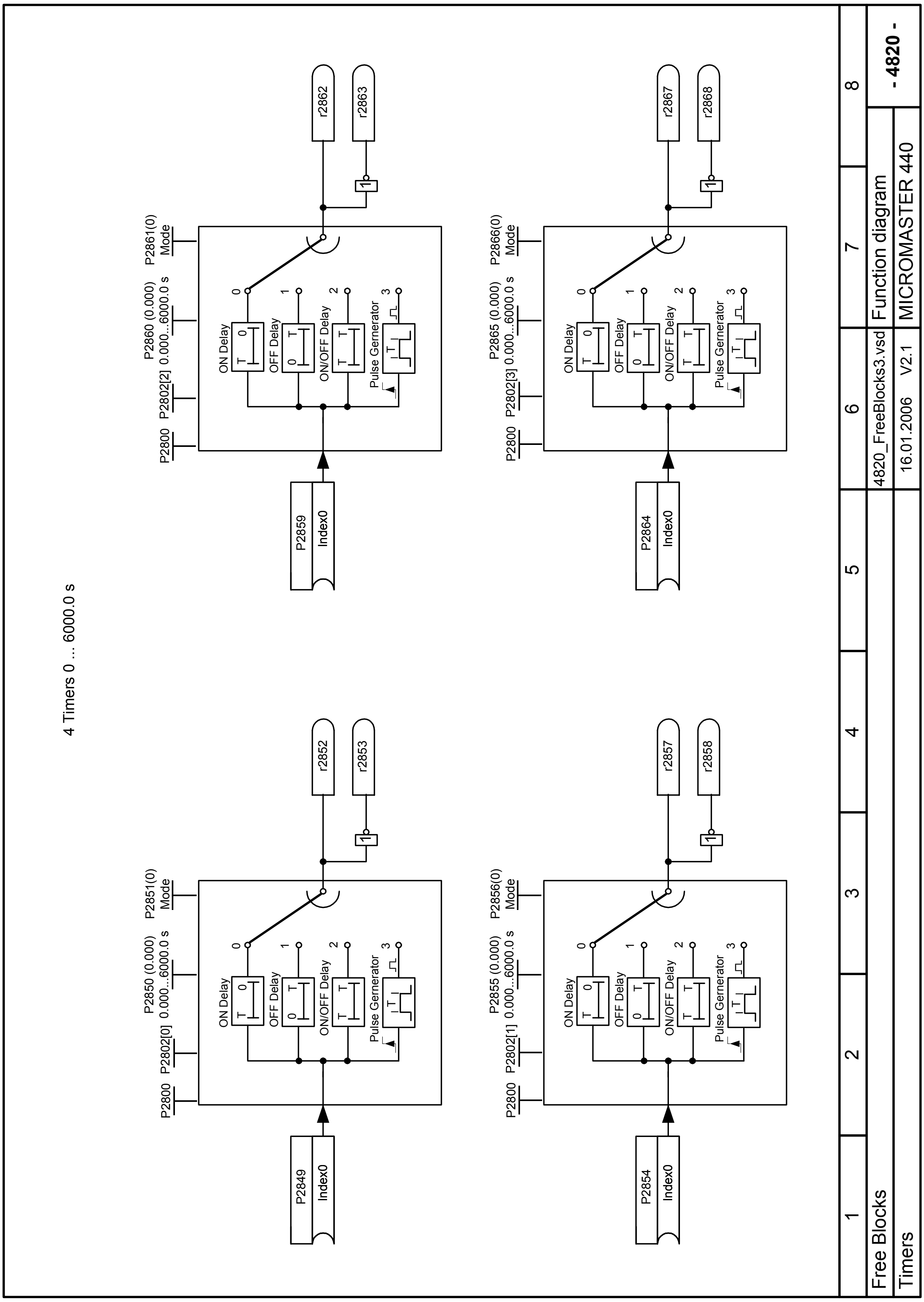
1	2	3	4	5	6	7	8
Technology Functions					4180_ZSW2.vsd	Function diagram	- 4180 -
Status word 2 (r0053)					16.01.2006 V2.1	MICROMASTER 440	

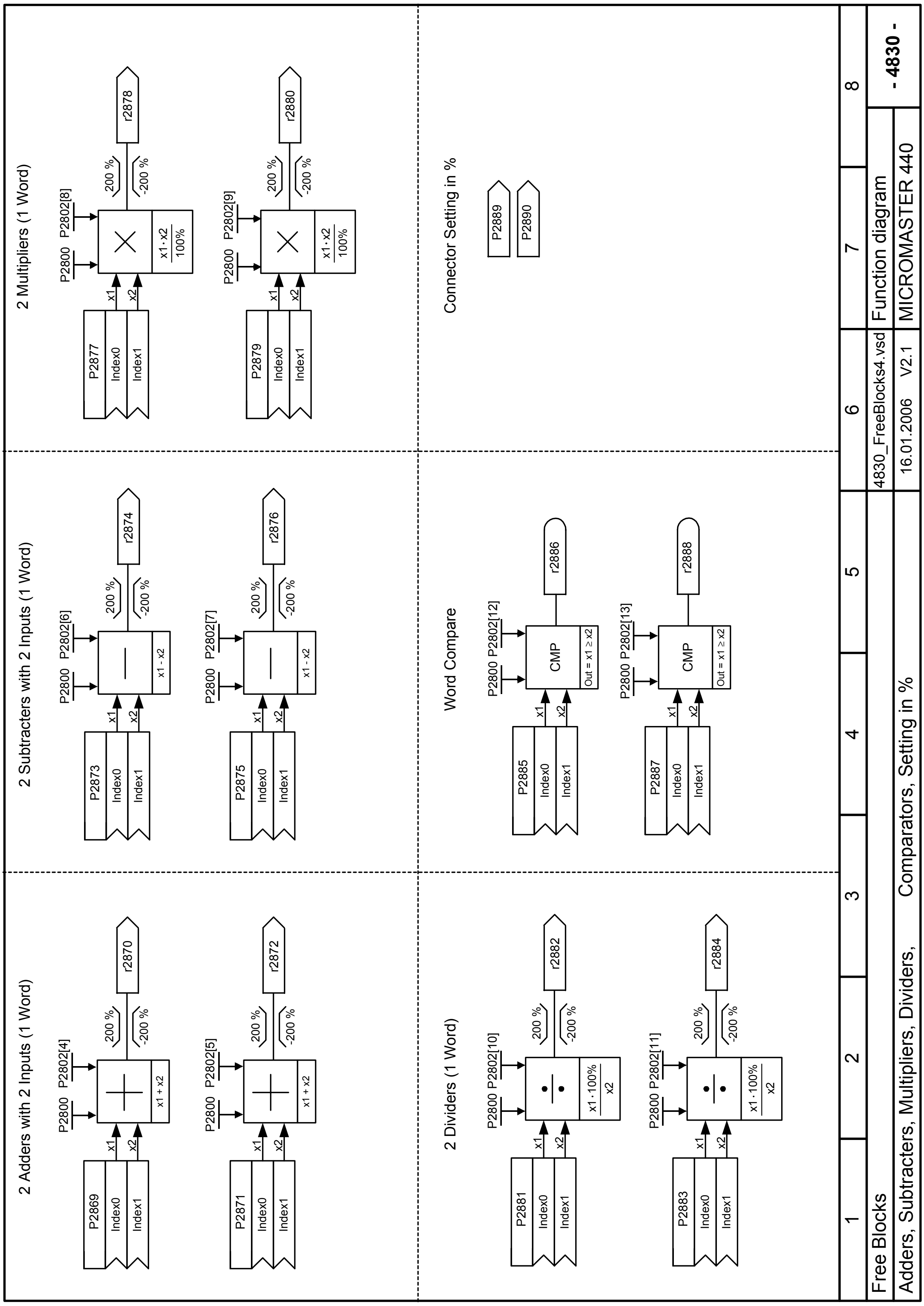

CO: Act. Vdc [V]
r0070
CO: Vdc-max ON lev [V]
r1242
Vdc controller
0 ... 3
P1240.D (1)
1,3
0,2
0
Vdc-max dyn. fact.
10 ... 200 [%]
P1243.D (100)
Dyn. factor of KIP
10 ... 200 [%]
P1247.D (100)
Int. time Vdc ctrl
0.1 ... 1000.0 [ms]
P1251.D (40.0)
Gain of Vdc ctrl.
0.00 ... 10.00
P1250.D (1.00)
Diff.time Vdc ctrl
0.0 ... 1000.0 [ms]
P1252.D (1.0)
CO: Act. Vdc [V]
r0070
KIB ON level
65 ... 115 [%]
P1245.D (76)
√2
100
Supply voltage
0 ... 1000 [V]
P0210 (230)
CO: KIB ON level [V]
r1246 [3]
Vdc controller
0 ... 3
P1240.D (1)
2,3
0,1
0
CO/BO:Stat MotCtrl
r0056
r0056 .14
r0056.15
1
Control mode
0 ... 23
P1300.D (0)
<20
≥20
Vdc ctrl outp. lim
0.00 ... 600.00 [Hz]
P1253.D (10.00)
f(VDC)
FP 6100
isq(VDC)
FP 7900
1
2
3
4
5
6
7
8
Technology Functions
Vdc Control (max, min)
4600.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 4600 -

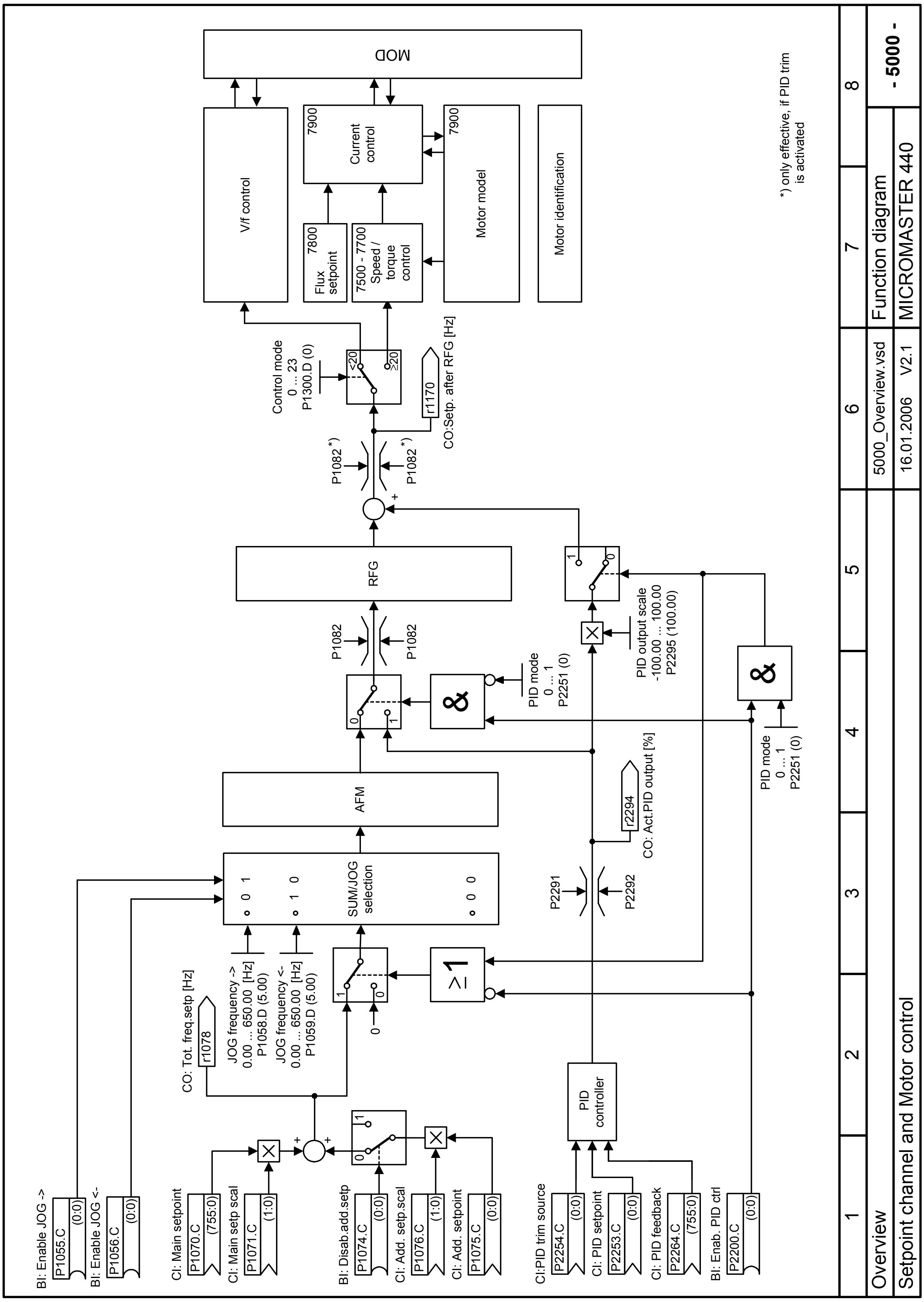

3 AND Elements with 2 Inputs
P2810 Index0 Index1
P2800 P2801[0]
&
r2811
P2812 Index0 Index1
P2800 P2801[1]
&
r2813
P2814 Index0 Index1
P2800 P2801[2]
&
r2815
3 OR Elements with 2 Inputs
P2816 Index0 Index1
P2800 P2801[3]
≥1
r2817
P2818 Index0 Index1
P2800 P2801[4]
≥1
r2819
P2820 Index0 Index1
P2800 P2801[5]
≥1
r2821
3 XOR Elements with 2 Inputs
P2822 Index0 Index1
P2800 P2801[6]
=1
r2823
P2824 Index0 Index1
P2800 P2801[7]
=1
r2825
P2826 Index0 Index1
P2800 P2801[8]
=1
r2827
3 NOT Elements with 1 Input
P2828 Index0
P2800 P2801[9]
1
r2829
P2830 Index0
P2800 P2801[10]
1
r2831
P2832 Index0
P2800 P2801[11]
1
r2833
1 2 3 4 5 6 7 8
Free Blocks
AND-, OR-, XOR- and NOT- Elements
4800_FreeBlocks1.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 4800 -



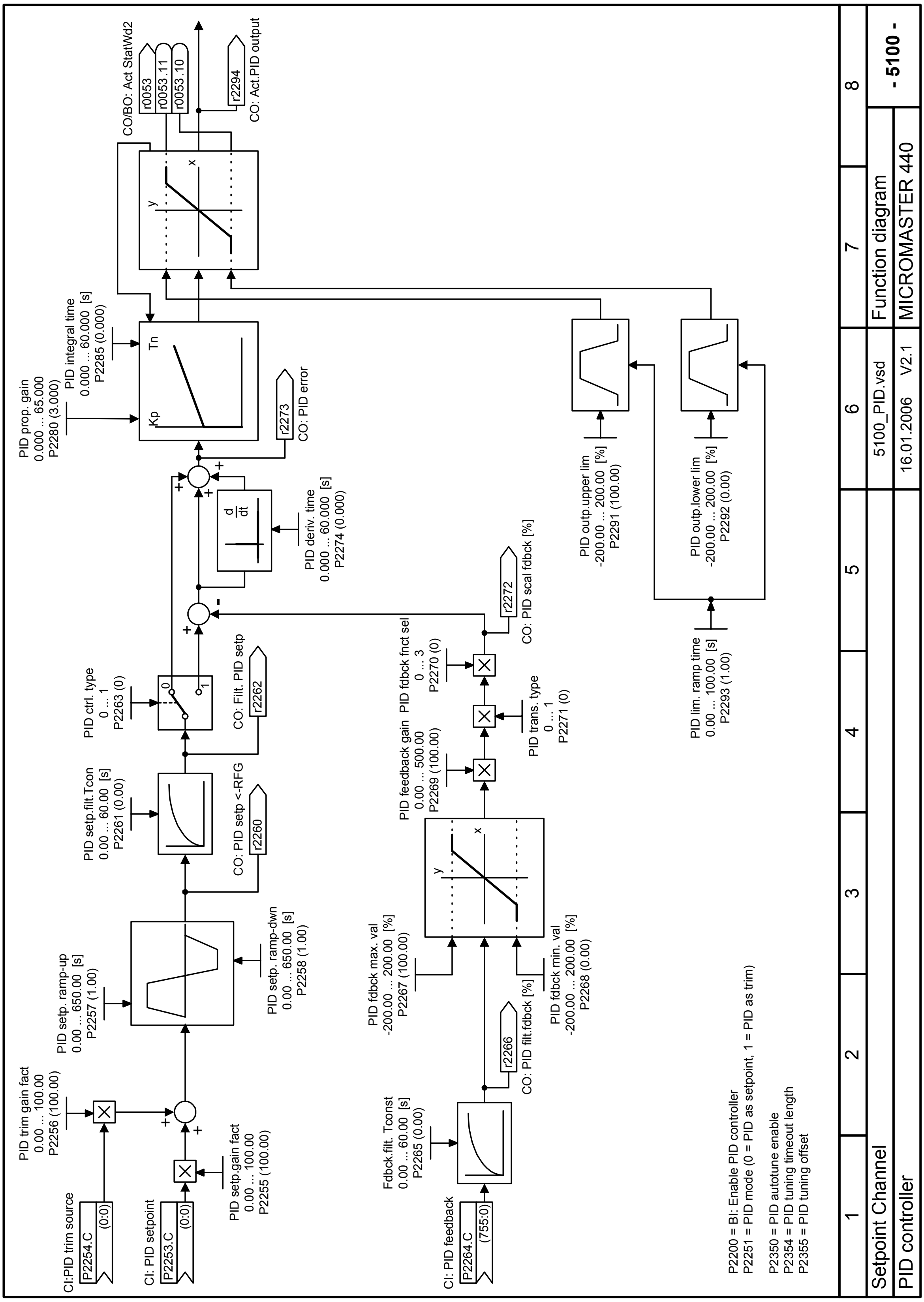
2 D FlipFlops
P2800 P2801[12]
SET (Q=1)
D
Q
STORE
RESET (Q=0)
P2834
Index0
Index1
Index2
Index3
≥1
POWER ON
r2835
r2836
P2800 P2801[13]
P2837
r2838
r2839
3 RS FlipFlops
P2800 P2801[14]
SET (Q=1)
RESET (Q=0)
P2840
Index0
Index1
POWER ON
r2841
r2842
P2800 P2801[15]
P2843
r2844
r2845
P2800 P2801[16]
P2846
r2847
r2848
1
2
3
4
5
6
7
8
Free Blocks
FlipFlops
4810_FreeBlocks2.vsd
16.01.2006
V2.1
Function diagram
MICROMASTER 440
- 4810 -


4 Timers 0 ... 6000.0 s
P2849
Index0
P2800
P2802[0]
P2850 (0.000)
0.000...6000.0 s
P2851(0)
Mode
ON Delay
OFF Delay
ON/OFF Delay
Pulse Gernerator
r2852
r2853
P2854
Index0
P2802[1]
P2855 (0.000)
0.000...6000.0 s
P2856(0)
r2857
r2858
P2859
Index0
P2802[2]
P2860 (0.000)
0.000...6000.0 s
P2861(0)
r2862
r2863
P2864
Index0
P2802[3]
P2865 (0.000)
0.000...6000.0 s
P2866(0)
r2867
r2868
Free Blocks
Timers
4820_FreeBlocks3.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 4820 -

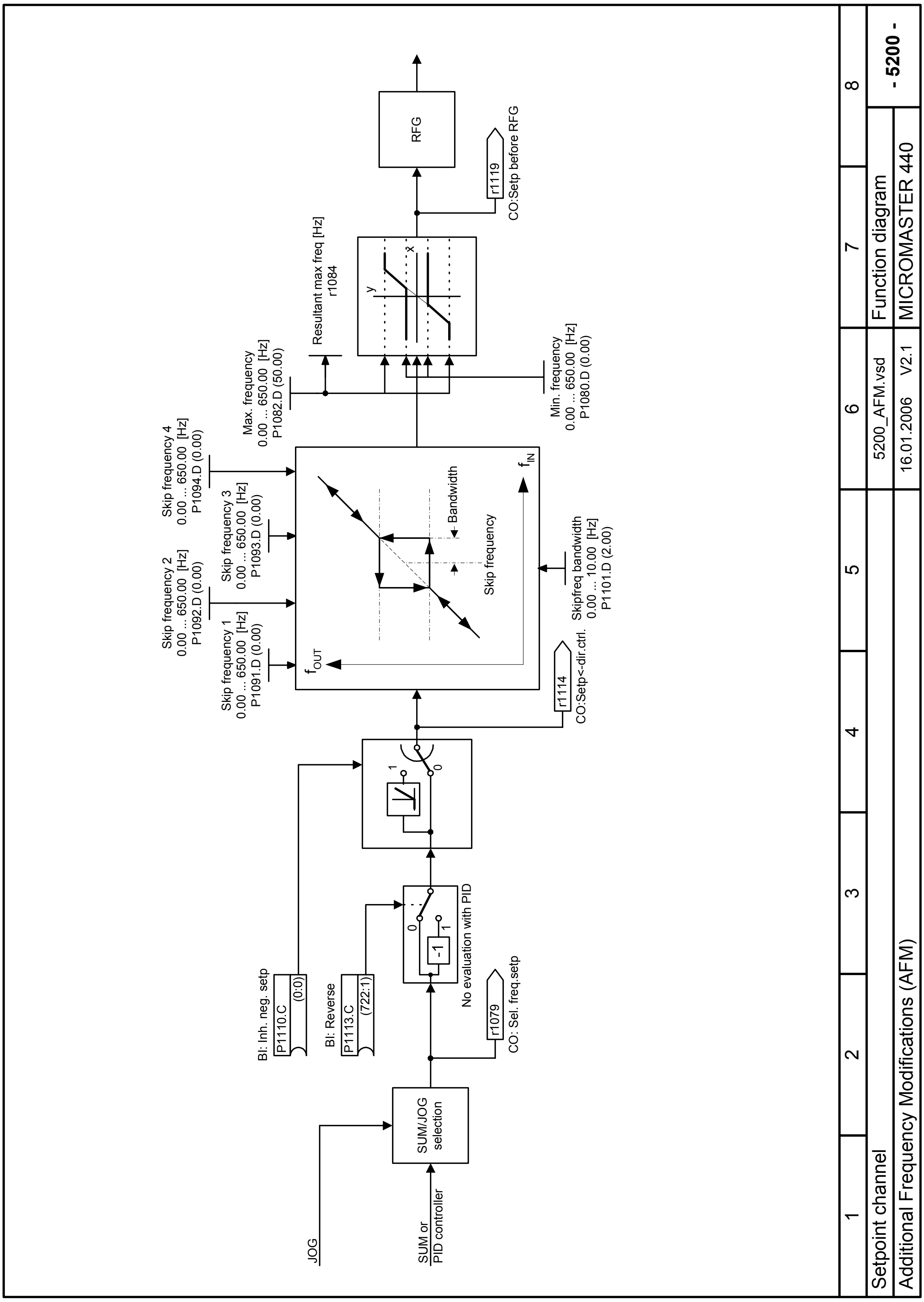

2 Adders with 2 Inputs (1 Word)
P2869 Index0 Index1
P2800 P2802[4]
x1 x2
x1 + x2
200 % -200 %
r2870
P2871 Index0 Index1
P2800 P2802[5]
r2872
2 Subtracters with 2 Inputs (1 Word)
P2873 Index0 Index1
P2800 P2802[6]
x1 - x2
r2874
P2875 Index0 Index1
P2800 P2802[7]
r2876
2 Multipliers (1 Word)
P2877 Index0 Index1
P2800 P2802[8]
x1 · x2 / 100%
r2878
P2879 Index0 Index1
P2800 P2802[9]
r2880
2 Dividers (1 Word)
P2881 Index0 Index1
P2800 P2802[10]
x1 · 100% / x2
r2882
P2883 Index0 Index1
P2800 P2802[11]
r2884
Word Compare
P2885 Index0 Index1
P2800 P2802[12]
CMP
Out = x1 ≥ x2
r2886
P2887 Index0 Index1
P2800 P2802[13]
r2888
Connector Setting in %
P2889
P2890
1 2 3 4 5 6 7 8
Free Blocks
Adders, Subtracters, Multipliers, Dividers, Comparators, Setting in %
4830_FreeBlocks4.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 4830 -

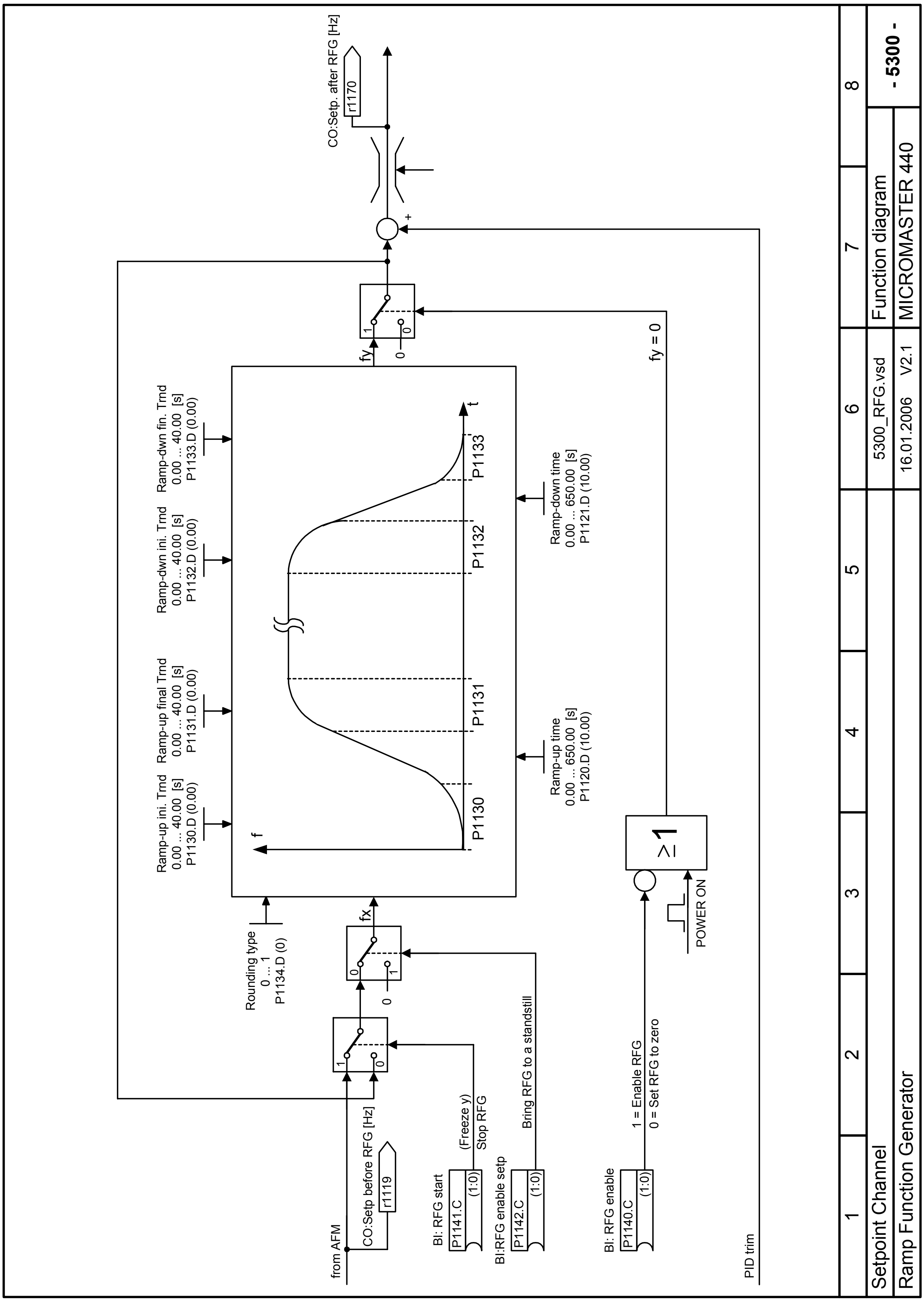


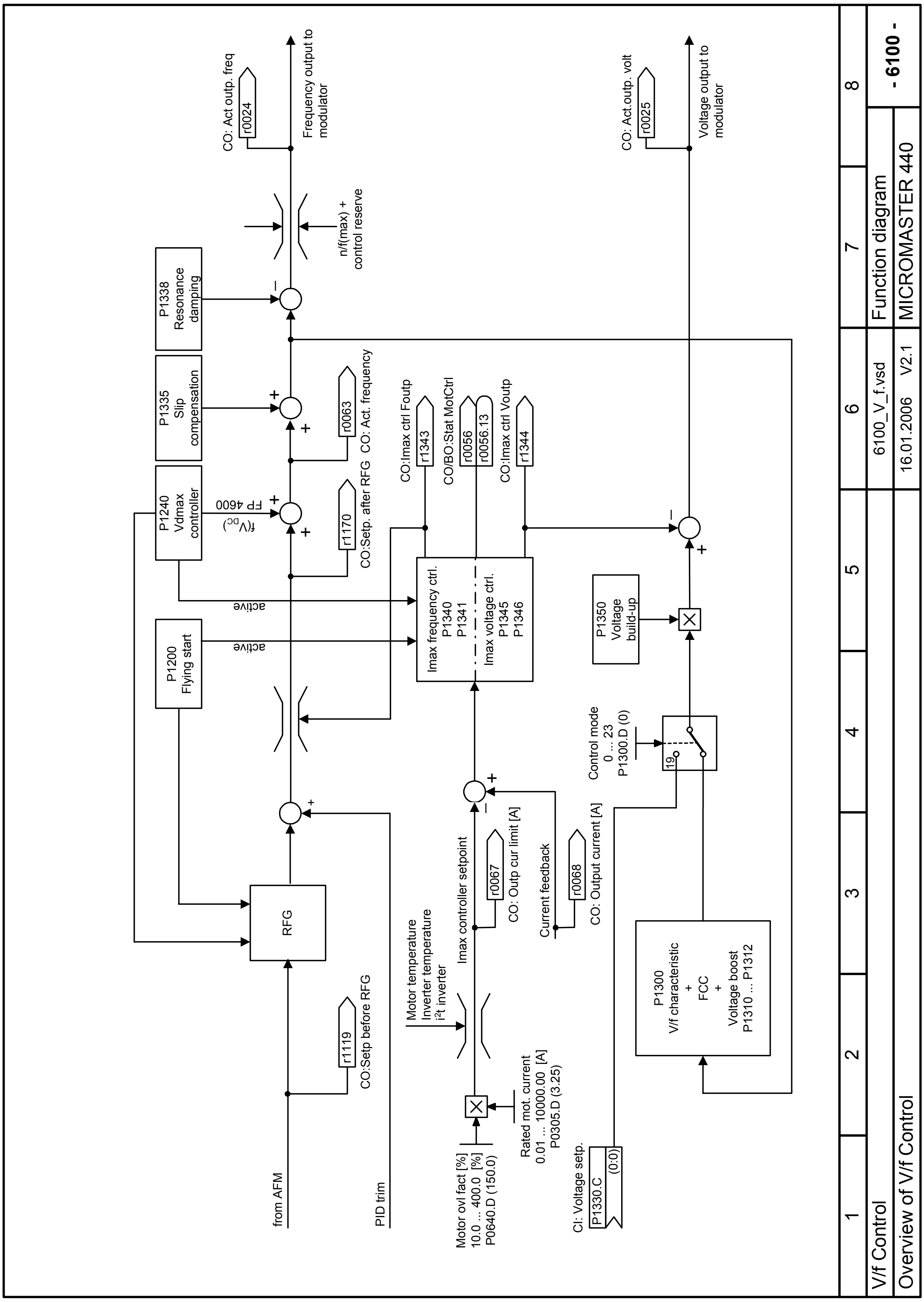
BI: Enable JOG ->
P1055.C (0:0)
BI: Enable JOG <-
P1056.C (0:0)
CI: Main setpoint
P1070.C (755:0)
CI: Main setp scal
P1071.C (1:0)
BI: Disab.add.setp
P1074.C (0:0)
CI: Add. setp.scal
P1076.C (1:0)
CI: Add. setpoint
P1075.C (0:0)
CI:PID trim source
P2254.C (0:0)
CI: PID setpoint
P2253.C (0:0)
CI: PID feedback
P2264.C (755:0)
BI: Enab. PID ctrl
P2200.C (0:0)
CO: Tot. freq.setp [Hz]
r1078
JOG frequency ->
0.00 ... 650.00 [Hz]
P1058.D (5.00)
JOG frequency <-
0.00 ... 650.00 [Hz]
P1059.D (5.00)
SUM/JOG selection
PID controller
P2291
P2292
r2294
CO: Act.PID output [%]
AFM
PID mode
0 ... 1
P2251 (0)
P1082
RFG
PID output scale
-100.00 ... 100.00
P2295 (100.00)
P1082 *)
r1170
CO:Setp. after RFG [Hz]
Control mode
0 ... 23
P1300.D (0)
<20
≥20
V/f control
Flux setpoint 7800
7500 - 7700 Speed / torque control
Current control 7900
Motor model 7900
Motor identification
MOD
*) only effective, if PID trim is activated
1 2 3 4 5 6 7 8
Overview
Setpoint channel and Motor control
5000_Overview.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 5000 -



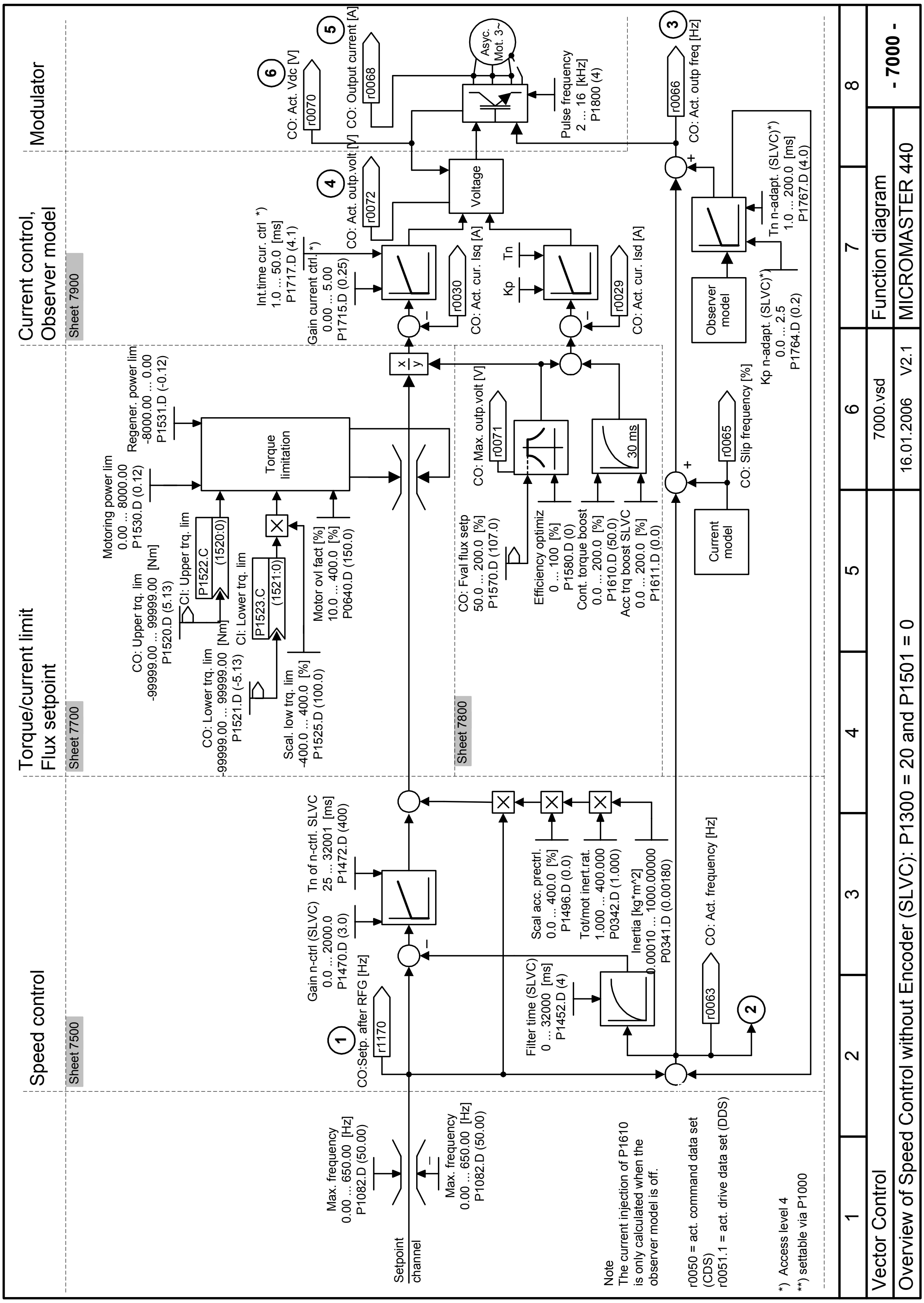
CI:PID trim source
P2254.C (0:0)
CI: PID setpoint
P2253.C (0:0)
CI: PID feedback
P2264.C (755:0)
PID trim gain fact
0.00 ... 100.00
P2256 (100.00)
PID setp.gain fact
0.00 ... 100.00
P2255 (100.00)
PID setp. ramp-up
0.00 ...650.00 [s]
P2257 (1.00)
PID setp. ramp-dwn
0.00 ... 650.00 [s]
P2258 (1.00)
PID setp.filt.Tcon
0.00 ... 60.00 [s]
P2261 (0.00)
r2260
CO: PID setp <-RFG
PID ctrl. type
0 ... 1
P2263 (0)
r2262
CO: Filt. PID setp
Fdbck.filt. Tconst
0.00 ... 60.00 [s]
P2265 (0.00)
r2266
CO: PID filt.fdbck [%]
PID fdbck max. val
-200.00 ... 200.00 [%]
P2267 (100.00)
PID fdbck min. val
-200.00 ... 200.00 [%]
P2268 (0.00)
PID feedback gain
0.00 ... 500.00
P2269 (100.00)
PID trans. type
0 ... 1
P2271 (0)
PID fdbck fnct sel
0 ... 3
P2270 (0)
r2272
CO: PID scal fdbck [%]
PID deriv. time
0.000 ... 60.000 [s]
P2274 (0.000)
r2273
CO: PID error
PID prop. gain
0.000 ... 65.000
P2280 (3.000)
PID integral time
0.000 ... 60.000 [s]
P2285 (0.000)
Kp
Tn
PID outp.upper lim
-200.00 ... 200.00 [%]
P2291 (100.00)
PID outp.lower lim
-200.00 ... 200.00 [%]
P2292 (0.00)
PID lim. ramp time
0.00 ... 100.00 [s]
P2293 (1.00)
CO/BO: Act StatWd2
r0053
r0053.11
r0053.10
r2294
CO: Act.PID output
P2200 = BI: Enable PID controller
P2251 = PID mode (0 = PID as setpoint, 1 = PID as trim)
P2350 = PID autotune enable
P2354 = PID tuning timeout length
P2355 = PID tuning offset
1 2 3 4 5 6 7 8
Setpoint Channel
PID controller
5100_PID.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 5100 -

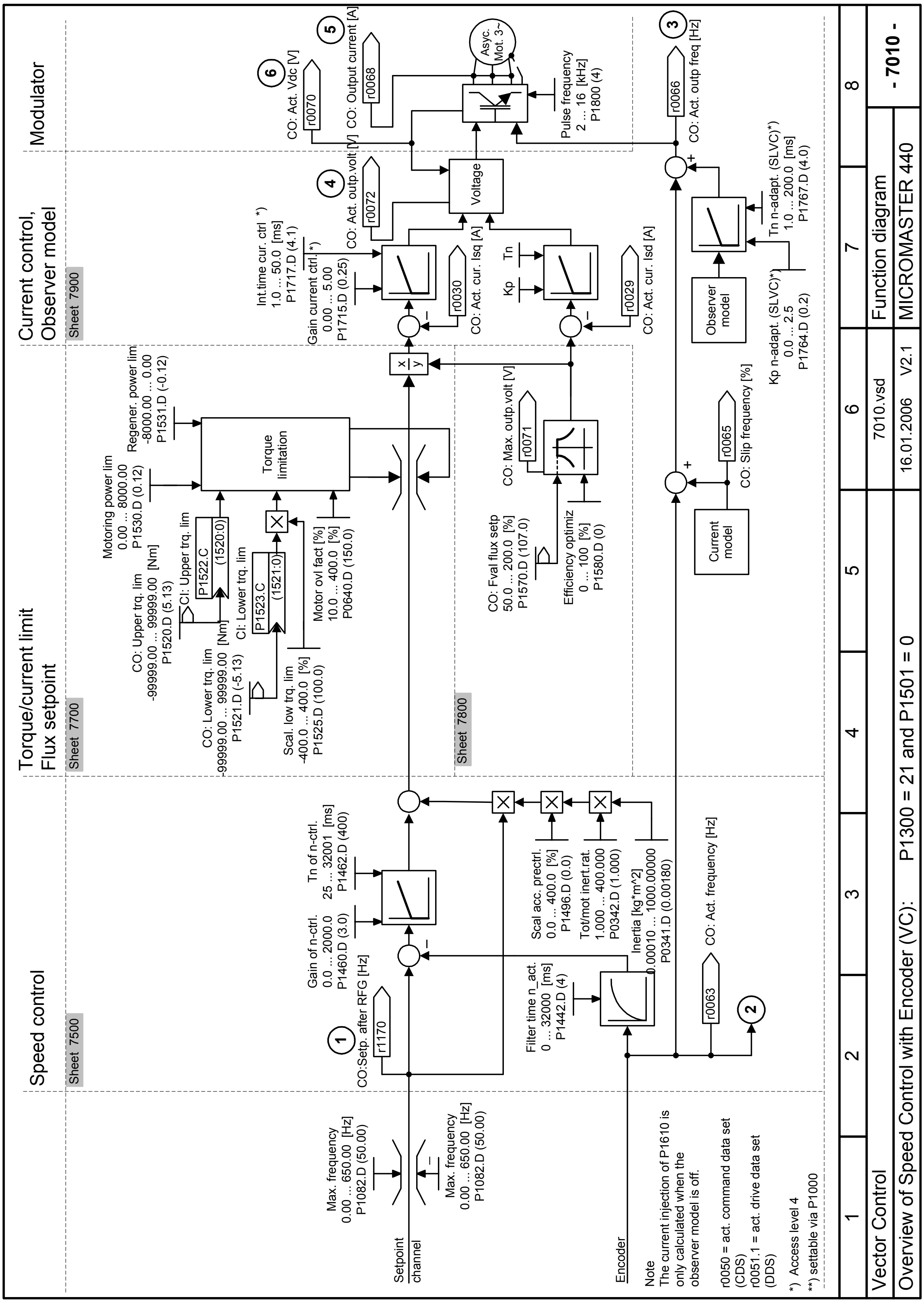

JOG
SUM or
PID controller
SUM/JOG
selection
BI: Inh. neg. setp
P1110.C
(0:0)
BI: Reverse
P1113.C
(722:1)
r1079
CO: Sel. freq.setp
-1
No evaluation with PID
r1114
CO:Setp<-dir.ctrl.
Skip frequency 1
0.00 ... 650.00 [Hz]
P1091.D (0.00)
Skip frequency 2
0.00 ... 650.00 [Hz]
P1092.D (0.00)
Skip frequency 3
0.00 ... 650.00 [Hz]
P1093.D (0.00)
Skip frequency 4
0.00 ... 650.00 [Hz]
P1094.D (0.00)
Bandwidth
Skip frequency
fOUT
fIN
Skipfreq bandwidth
0.00 ... 10.00 [Hz]
P1101.D (2.00)
Max. frequency
0.00 ... 650.00 [Hz]
P1082.D (50.00)
Resultant max freq [Hz]
r1084
Min. frequency
0.00 ... 650.00 [Hz]
P1080.D (0.00)
r1119
CO:Setp before RFG
RFG
1 2 3 4 5 6 7 8
Setpoint channel
Additional Frequency Modifications (AFM)
5200_AFM.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 5200 -

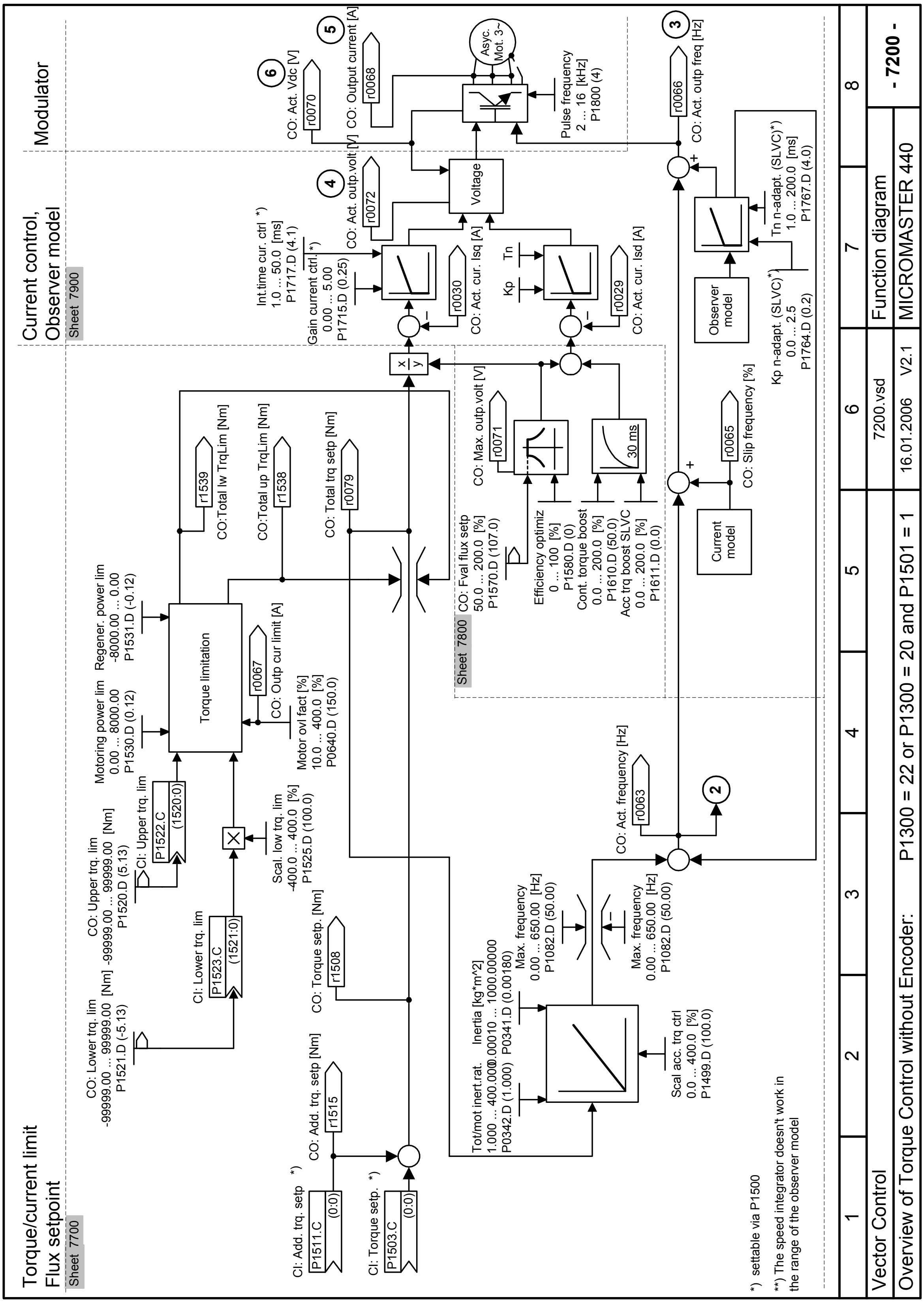

CO:Setp. after RFG [Hz]
r1170
Ramp-up ini. Trnd
0.00 ... 40.00 [s]
P1130.D (0.00)
Ramp-up final Trnd
0.00 ... 40.00 [s]
P1131.D (0.00)
Ramp-dwn ini. Trnd
0.00 ... 40.00 [s]
P1132.D (0.00)
Ramp-dwn fin. Trnd
0.00 ... 40.00 [s]
P1133.D (0.00)
Ramp-up time
0.00 ... 650.00 [s]
P1120.D (10.00)
Ramp-down time
0.00 ... 650.00 [s]
P1121.D (10.00)
P1130
P1131
P1132
P1133
f
t
fx
fy
fy = 0
Rounding type
0 ... 1
P1134.D (0)
≥1
POWER ON
from AFM
CO:Setp before RFG [Hz]
r1119
BI: RFG start
P1141.C
(1:0)
(Freeze y)
Stop RFG
BI:RFG enable setp
P1142.C
(1:0)
Bring RFG to a standstill
BI: RFG enable
P1140.C
(1:0)
1 = Enable RFG
0 = Set RFG to zero
PID trim
1 2 3 4 5 6 7 8
Setpoint Channel
Ramp Function Generator
5300_RFG.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 5300 -

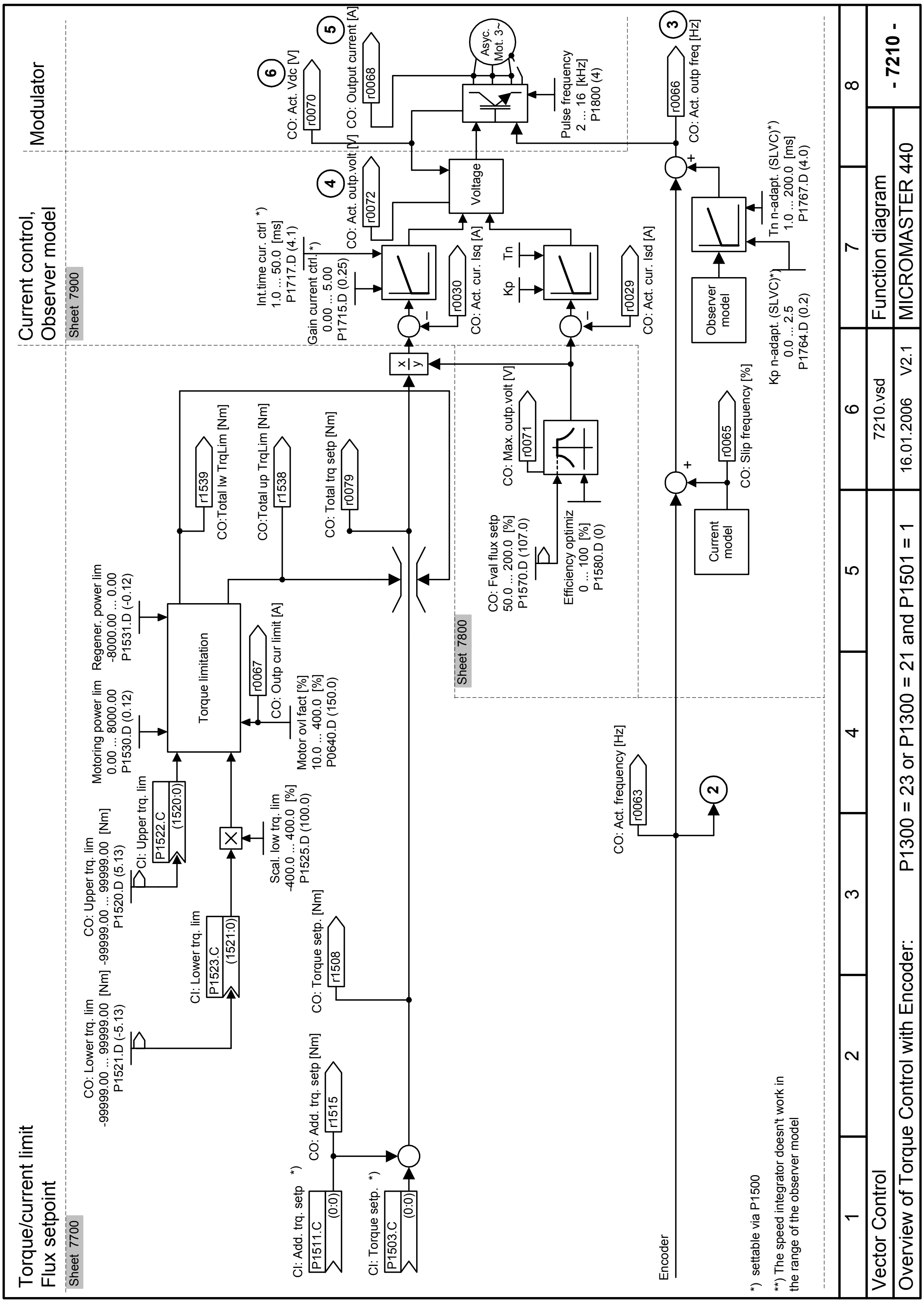


from AFM
PID trim
r1119
CO:Setp before RFG
RFG
P1200
Flying start
active
P1240
Vdmax
controller
active
FP 4600
f(V_DC)
r1170
CO:Setp. after RFG
r0063
CO: Act. frequency
P1335
Slip
compensation
P1338
Resonance
damping
n/f(max) +
control reserve
r0024
CO: Act outp. freq
Frequency output to
modulator
Motor ovl fact [%]
10.0 ... 400.0 [%]
P0640.D (150.0)
Rated mot. current
0.01 ... 10000.00 [A]
P0305.D (3.25)
Motor temperature
Inverter temperature
i²t inverter
Imax controller setpoint
r0067
CO: Outp cur limit [A]
Current feedback
r0068
CO: Output current [A]
Imax frequency ctrl.
P1340
P1341
Imax voltage ctrl.
P1345
P1346
r1343
CO:Imax ctrl Foutp
r0056
r0056.13
CO/BO:Stat MotCtrl
r1344
CO:Imax ctrl Voutp
CI: Voltage setp.
P1330.C
(0:0)
P1300
V/f characteristic
+
FCC
+
Voltage boost
P1310 ... P1312
Control mode
0 ... 23
P1300.D (0)
19
P1350
Voltage
build-up
r0025
CO: Act.outp. volt
Voltage output to
modulator
1
2
3
4
5
6
7
8
V/f Control
Overview of V/f Control
6100_V_f.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 6100 -

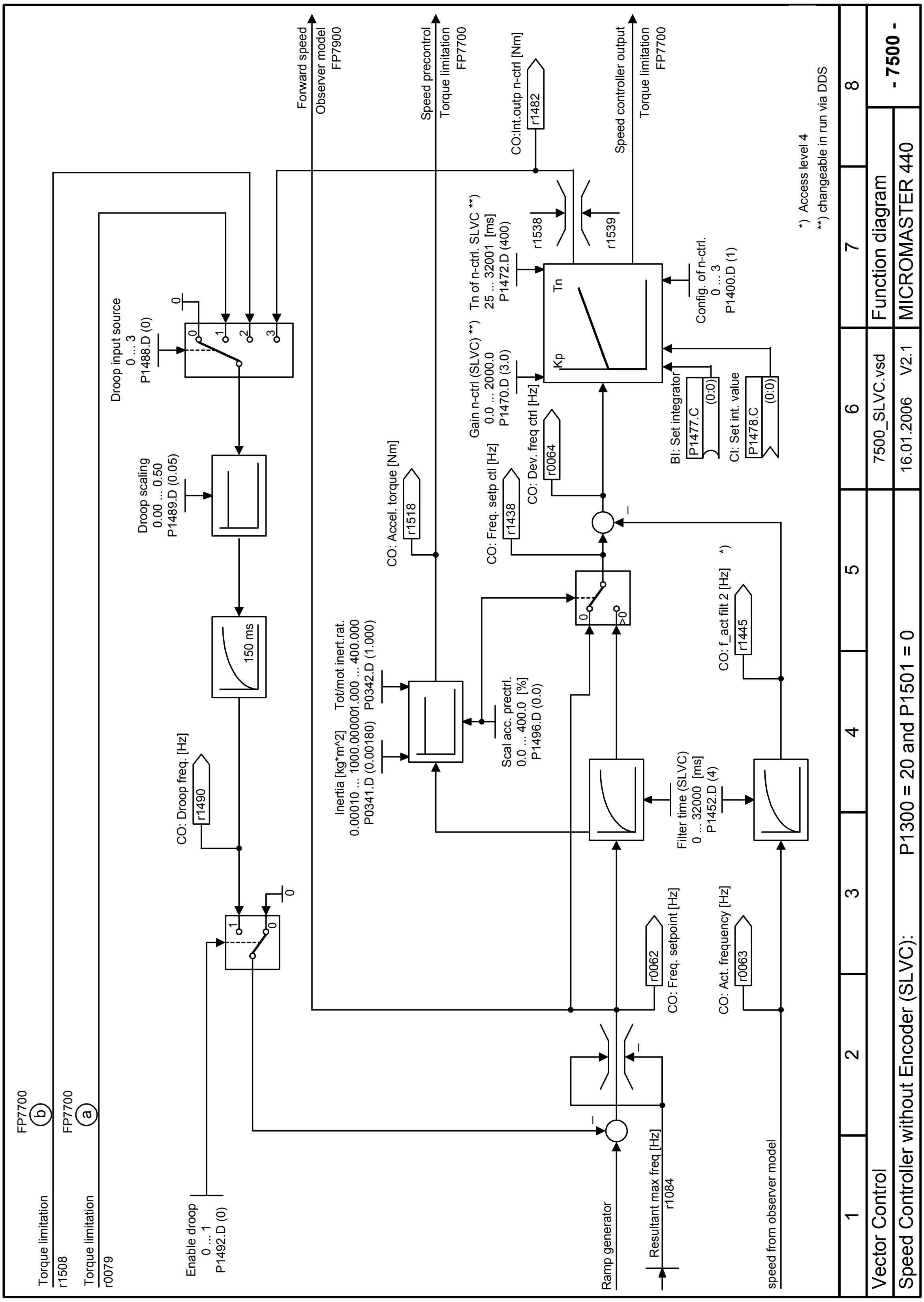

Speed control
Sheet 7500
Torque/current limit
Flux setpoint
Sheet 7700
Sheet 7800
Current control,
Observer model
Sheet 7900
Modulator
Setpoint channel
Max. frequency
0.00 ... 650.00 [Hz]
P1082.D (50.00)
CO:Setp. after RFG [Hz]
r1170
Gain n-ctrl (SLVC)
0.0 ... 2000.0
P1470.D (3.0)
Tn of n-ctrl. SLVC
25 ... 32001 [ms]
P1472.D (400)
Filter time (SLVC)
0 ... 32000 [ms]
P1452.D (4)
Scal acc. prectrl.
0.0 ... 400.0 [%]
P1496.D (0.0)
Tot/mot inert.rat.
1.000 ... 400.000
P0342.D (1.000)
Inertia [kg*m^2]
0.00010 ... 1000.00000
P0341.D (0.00180)
r0063
CO: Act. frequency [Hz]
CO: Upper trq. lim
-99999.00 ... 99999.00 [Nm]
P1520.D (5.13)
CI: Upper trq. lim
P1522.C
(1520:0)
CO: Lower trq. lim
-99999.00 ... 99999.00 [Nm]
P1521.D (-5.13)
CI: Lower trq. lim
P1523.C
(1521:0)
Scal. low trq. lim
-400.0 ... 400.0 [%]
P1525.D (100.0)
Motor ovl fact [%]
10.0 ... 400.0 [%]
P0640.D (150.0)
Motoring power lim
0.00 ... 8000.00
P1530.D (0.12)
Regener. power lim
-8000.00 ... 0.00
P1531.D (-0.12)
Torque limitation
CO: Fval flux setp
50.0 ... 200.0 [%]
P1570.D (107.0)
CO: Max. outp.volt [V]
r0071
Efficiency optimiz
0 ... 100 [%]
P1580.D (0)
Cont. torque boost
0.0 ... 200.0 [%]
P1610.D (50.0)
Acc trq boost SLVC
0.0 ... 200.0 [%]
P1611.D (0.0)
30 ms
Current model
r0065
CO: Slip frequency [%]
Int.time cur. ctrl *)
1.0 ... 50.0 [ms]
P1717.D (4.1)
Gain current ctrl.*)
0.00 ... 5.00
P1715.D (0.25)
r0030
CO: Act. cur. Isq [A]
Kp
Tn
r0029
CO: Act. cur. Isd [A]
Observer model
Kp n-adapt. (SLVC)*)
0.0 ... 2.5
P1764.D (0.2)
Tn n-adapt. (SLVC)*)
1.0 ... 200.0 [ms]
P1767.D (4.0)
Voltage
r0072
CO: Act. outp.volt [V]
r0070
CO: Act. Vdc [V]
r0068
CO: Output current [A]
Asyc. Mot. 3~
Pulse frequency
2 ... 16 [kHz]
P1800 (4)
r0066
CO: Act. outp freq [Hz]
Note
The current injection of P1610 is only calculated when the observer model is off.
r0050 = act. command data set (CDS)
r0051.1 = act. drive data set (DDS)
*) Access level 4
**) settable via P1000
1 2 3 4 5 6 7 8
Vector Control
Overview of Speed Control without Encoder (SLVC): P1300 = 20 and P1501 = 0
7000.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 7000 -

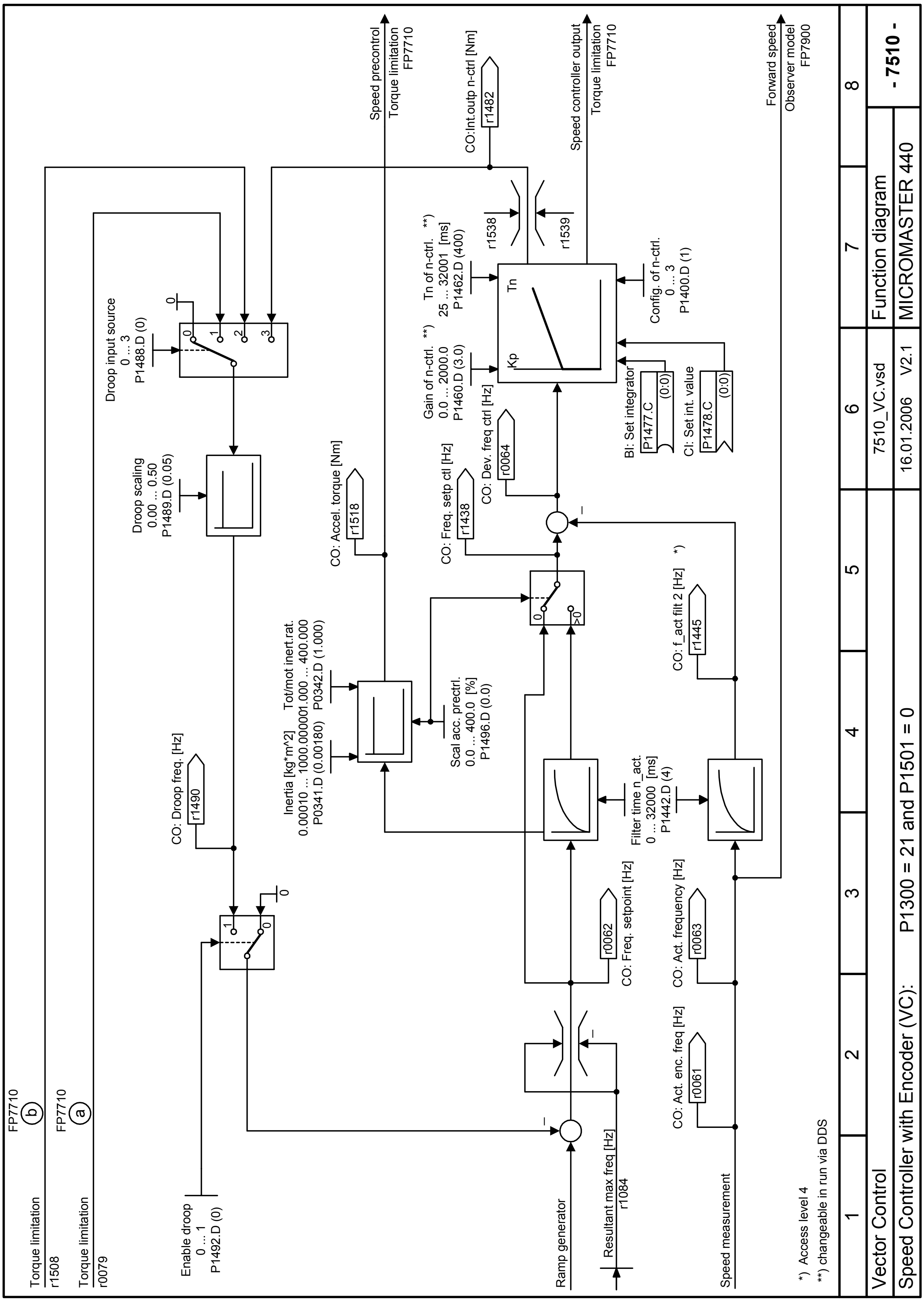

Speed control
Sheet 7500
Torque/current limit
Flux setpoint
Sheet 7700
Sheet 7800
Current control,
Observer model
Sheet 7900
Modulator
Setpoint channel
Max. frequency
0.00 ... 650.00 [Hz]
P1082.D (50.00)
Encoder
CO:Setp. after RFG [Hz]
r1170
Gain of n-ctrl.
0.0 ... 2000.0
P1460.D (3.0)
Tn of n-ctrl.
25 ... 32001 [ms]
P1462.D (400)
Filter time n_act.
0 ... 32000 [ms]
P1442.D (4)
r0063
CO: Act. frequency [Hz]
Scal acc. prectrl.
0.0 ... 400.0 [%]
P1496.D (0.0)
Tot/mot inert.rat.
1.000 ... 400.000
P0342.D (1.000)
Inertia [kg*m^2]
0.00010 ... 1000.00000
P0341.D (0.00180)
CO: Lower trq. lim
-99999.00 ... 99999.00 [Nm]
P1521.D (-5.13)
CO: Upper trq. lim
-99999.00 ... 99999.00 [Nm]
P1520.D (5.13)
CI: Upper trq. lim
P1522.C
(1520:0)
CI: Lower trq. lim
P1523.C
(1521:0)
Scal. low trq. lim
-400.0 ... 400.0 [%]
P1525.D (100.0)
Motor ovl fact [%]
10.0 ... 400.0 [%]
P0640.D (150.0)
Motoring power lim
0.00 ... 8000.00
P1530.D (0.12)
Regener. power lim
-8000.00 ... 0.00
P1531.D (-0.12)
Torque limitation
CO: Fval flux setp
50.0 ... 200.0 [%]
P1570.D (107.0)
Efficiency optimiz
0 ... 100 [%]
P1580.D (0)
CO: Max. outp.volt [V]
r0071
Current model
r0065
CO: Slip frequency [%]
Observer model
Kp n-adapt. (SLVC)*)
0.0 ... 2.5
P1764.D (0.2)
Tn n-adapt. (SLVC)*)
1.0 ... 200.0 [ms]
P1767.D (4.0)
Int.time cur. ctrl *)
1.0 ... 50.0 [ms]
P1717.D (4.1)
Gain current ctrl.*)
0.00 ... 5.00
P1715.D (0.25)
r0030
CO: Act. cur. Isq [A]
Kp
Tn
r0029
CO: Act. cur. Isd [A]
r0072
CO: Act. outp.volt [V]
Voltage
r0070
CO: Act. Vdc [V]
r0068
CO: Output current [A]
Asyc. Mot. 3~
Pulse frequency
2 ... 16 [kHz]
P1800 (4)
r0066
CO: Act. outp freq [Hz]
Note
The current injection of P1610 is only calculated when the observer model is off.
r0050 = act. command data set (CDS)
r0051.1 = act. drive data set (DDS)
*) Access level 4
**) settable via P1000
1 2 3 4 5 6 7 8
Vector Control
Overview of Speed Control with Encoder (VC): P1300 = 21 and P1501 = 0
7010.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 7010 -

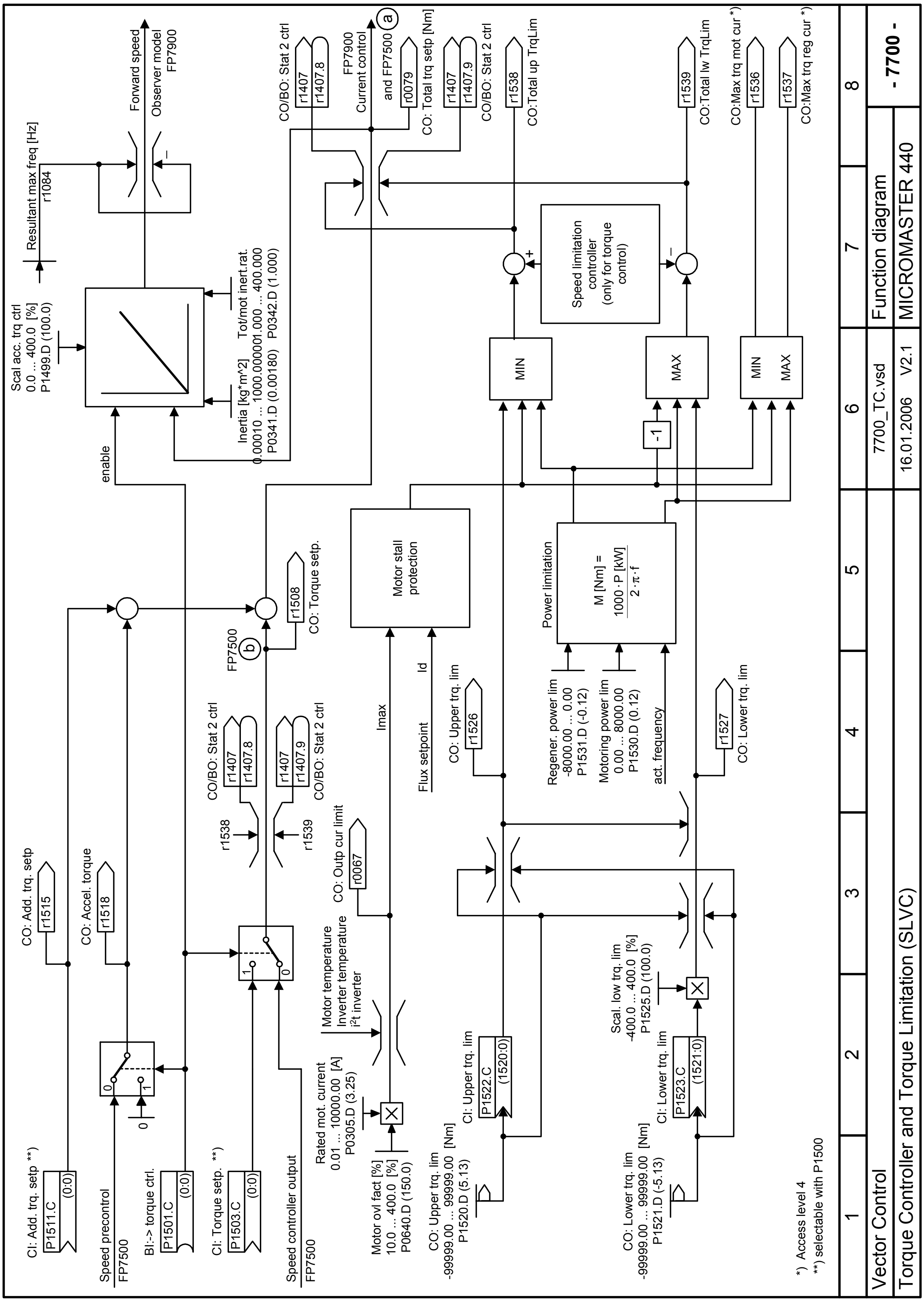

Torque/current limit
Flux setpoint
Sheet 7700
Current control,
Observer model
Sheet 7900
Modulator
Sheet 7800
CI: Add. trq. setp *)
P1511.C
(0:0)
CI: Torque setp. *)
P1503.C
(0:0)
CO: Add. trq. setp [Nm]
r1515
CO: Torque setp. [Nm]
r1508
CO: Lower trq. lim
-99999.00 ... 99999.00 [Nm]
P1521.D (-5.13)
CO: Upper trq. lim
-99999.00 ... 99999.00 [Nm]
P1520.D (5.13)
CI: Lower trq. lim
P1523.C
(1521:0)
CI: Upper trq. lim
P1522.C
(1520:0)
Scal. low trq. lim
-400.0 ... 400.0 [%]
P1525.D (100.0)
Motoring power lim
0.00 ... 8000.00
P1530.D (0.12)
Regener. power lim
-8000.00 ... 0.00
P1531.D (-0.12)
Torque limitation
CO: Outp cur limit [A]
r0067
Motor ovl fact [%]
10.0 ... 400.0 [%]
P0640.D (150.0)
CO:Total lw TrqLim [Nm]
r1539
CO:Total up TrqLim [Nm]
r1538
CO: Total trq setp [Nm]
r0079
Tot/mot inert.rat.
1.000 ... 400.000
P0342.D (1.000)
Inertia [Kg*m^2]
0.00010 ... 1000.00000
P0341.D (0.00180)
Max. frequency
0.00 ... 650.00 [Hz]
P1082.D (50.00)
Scal acc. trq ctrl
0.0 ... 400.0 [%]
P1499.D (100.0)
CO: Act. frequency [Hz]
r0063
CO: Fval flux setp
50.0 ... 200.0 [%]
P1570.D (107.0)
Efficiency optimiz
0 ... 100 [%]
P1580.D (0)
Cont. torque boost
0.0 ... 200.0 [%]
P1610.D (50.0)
Acc trq boost SLVC
0.0 ... 200.0 [%]
P1611.D (0.0)
CO: Max. outp.volt [V]
r0071
30 ms
Current model
CO: Slip frequency [%]
r0065
Int.time cur. ctrl *)
1.0 ... 50.0 [ms]
P1717.D (4.1)
Gain current ctrl. *)
0.00 ... 5.00
P1715.D (0.25)
CO: Act. cur. Isq [A]
r0030
CO: Act. cur. Isd [A]
r0029
Kp
Tn
Observer model
Kp n-adapt. (SLVC)*)
0.0 ... 2.5
P1764.D (0.2)
Tn n-adapt. (SLVC)*)
1.0 ... 200.0 [ms]
P1767.D (4.0)
Voltage
CO: Act. outp.volt [V]
r0072
CO: Act. Vdc [V]
r0070
CO: Output current [A]
r0068
Asyc. Mot. 3~
Pulse frequency
2 ... 16 [kHz]
P1800 (4)
CO: Act. outp freq [Hz]
r0066
*) settable via P1500
**) The speed integrator doesn't work in the range of the observer model
1 2 3 4 5 6 7 8
Vector Control
Overview of Torque Control without Encoder:
P1300 = 22 or P1300 = 20 and P1501 = 1
7200.vsd
16.01.2006
V2.1
Function diagram
MICROMASTER 440
- 7200 -



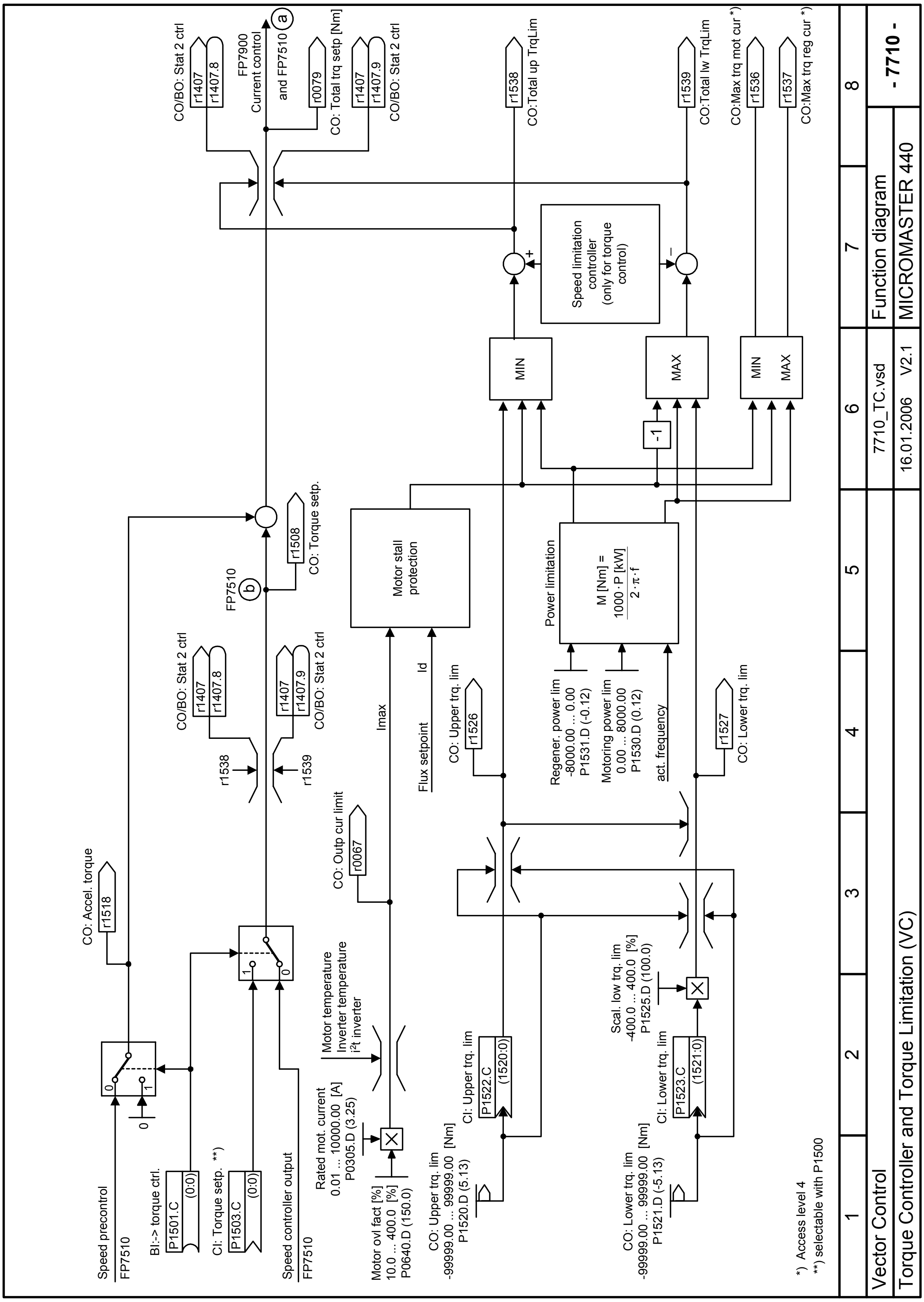
Torque/current limit
Flux setpoint
Sheet 7700
Current control,
Observer model
Sheet 7900
Modulator
Sheet 7800
CI: Add. trq. setp *)
P1511.C
(0:0)
CI: Torque setp. *)
P1503.C
(0:0)
CO: Add. trq. setp [Nm]
r1515
CO: Torque setp. [Nm]
r1508
CO: Lower trq. lim
-99999.00 ... 99999.00 [Nm]
P1521.D (-5.13)
CI: Lower trq. lim
P1523.C
(1521:0)
CO: Upper trq. lim
-99999.00 ... 99999.00 [Nm]
P1520.D (5.13)
CI: Upper trq. lim
P1522.C
(1520:0)
Scal. low trq. lim
-400.0 ... 400.0 [%]
P1525.D (100.0)
Motoring power lim
0.00 ... 8000.00
P1530.D (0.12)
Regener. power lim
-8000.00 ... 0.00
P1531.D (-0.12)
Torque limitation
r0067
CO: Outp cur limit [A]
Motor ovl fact [%]
10.0 ... 400.0 [%]
P0640.D (150.0)
r1539
CO:Total lw TrqLim [Nm]
r1538
CO:Total up TrqLim [Nm]
r0079
CO: Total trq setp [Nm]
CO: Fval flux setp
50.0 ... 200.0 [%]
P1570.D (107.0)
Efficiency optimiz
0 ... 100 [%]
P1580.D (0)
r0071
CO: Max. outp.volt [V]
Int.time cur. ctrl *)
1.0 ... 50.0 [ms]
P1717.D (4.1)
Gain current ctrl.*)
0.00 ... 5.00
P1715.D (0.25)
r0030
CO: Act. cur. Isq [A]
Kp
Tn
r0029
CO: Act. cur. Isd [A]
r0072
CO: Act. outp.volt [V]
Voltage
r0070
CO: Act. Vdc [V]
r0068
CO: Output current [A]
Asyc.
Mot. 3~
Pulse frequency
2 ... 16 [kHz]
P1800 (4)
Encoder
r0063
CO: Act. frequency [Hz]
Current
model
r0065
CO: Slip frequency [%]
Observer
model
Kp n-adapt. (SLVC)*)
0.0 ... 2.5
P1764.D (0.2)
Tn n-adapt. (SLVC)*)
1.0 ... 200.0 [ms]
P1767.D (4.0)
r0066
CO: Act. outp freq [Hz]
*) settable via P1500
**) The speed integrator doesn't work in the range of the observer model
1 2 3 4 5 6 7 8
Vector Control
Overview of Torque Control with Encoder:
P1300 = 23 or P1300 = 21 and P1501 = 1
7210.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 7210 -

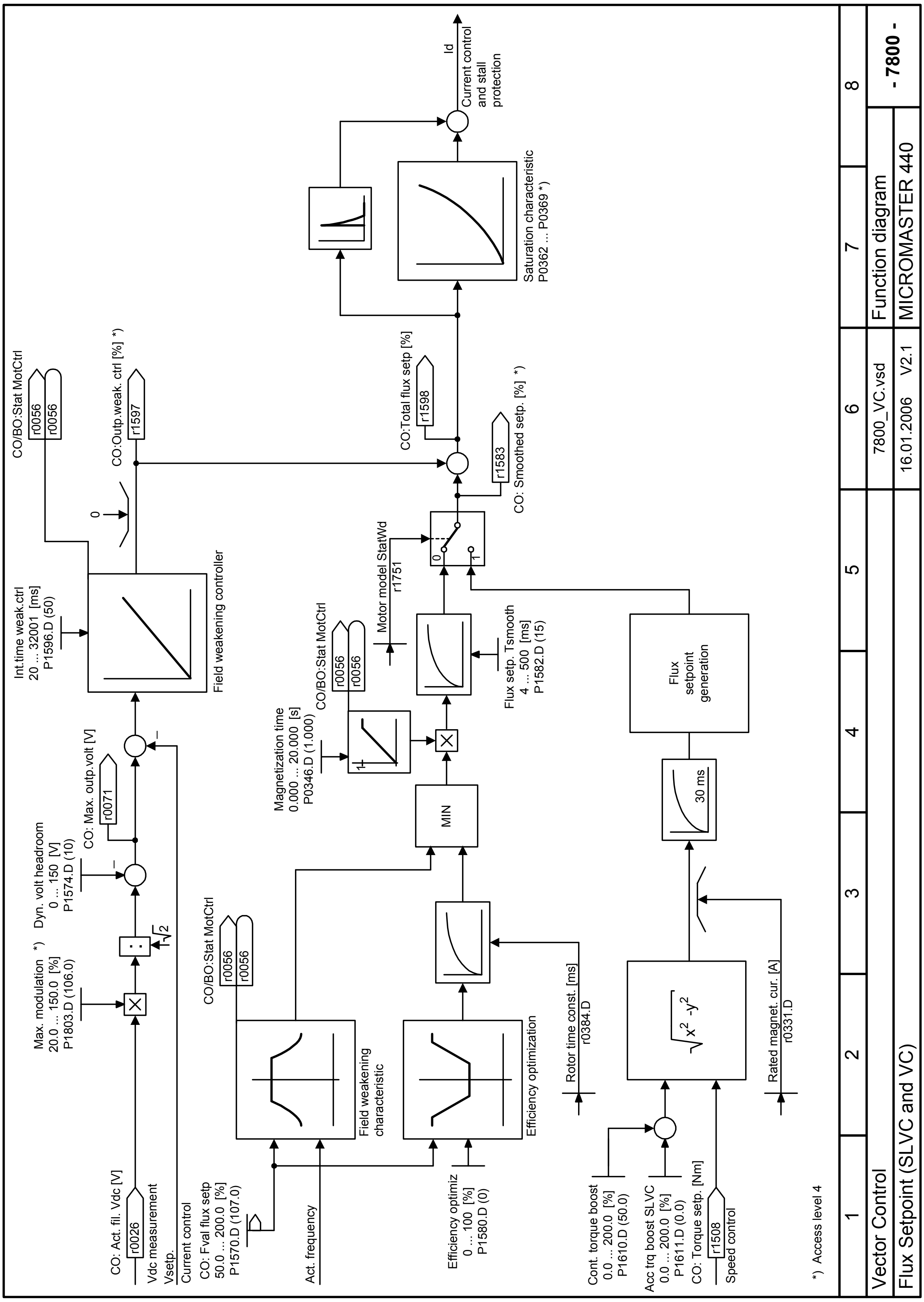

Torque limitation
r1508
FP7700
b
Torque limitation
r0079
FP7700
a
Enable droop
0 ... 1
P1492.D (0)
Ramp generator
Resultant max freq [Hz]
r1084
speed from observer model
CO: Freq. setpoint [Hz]
r0062
CO: Act. frequency [Hz]
r0063
CO: Droop freq. [Hz]
r1490
Droop scaling
0.00 ... 0.50
P1489.D (0.05)
150 ms
Droop input source
0 ... 3
P1488.D (0)
Filter time (SLVC)
0 ... 32000 [ms]
P1452.D (4)
Inertia [kg*m^2]
0.00010 ... 1000.000000
P0341.D (0.00180)
Tot/mot inert.rat.
1.000 ... 400.000
P0342.D (1.000)
Scal acc. prectrl.
0.0 ... 400.0 [%]
P1496.D (0.0)
CO: Accel. torque [Nm]
r1518
CO: Freq. setp ctl [Hz]
r1438
CO: Dev. freq ctrl [Hz]
r0064
CO: f_act filt 2 [Hz] *)
r1445
Gain n-ctrl (SLVC) **)
0.0 ... 2000.0
P1470.D (3.0)
Tn of n-ctrl. SLVC **)
25 ... 32001 [ms]
P1472.D (400)
Kp
Tn
r1538
r1539
CO:Int.outp n-ctrl [Nm]
r1482
BI: Set integrator
P1477.C
(0:0)
CI: Set int. value
P1478.C
(0:0)
Config. of n-ctrl.
0 ... 3
P1400.D (1)
Forward speed
Observer model
FP7900
Speed precontrol
Torque limitation
FP7700
Speed controller output
Torque limitation
FP7700
*) Access level 4
**) changeable in run via DDS
1 2 3 4 5 6 7 8
Vector Control
Speed Controller without Encoder (SLVC):
P1300 = 20 and P1501 = 0
7500_SLVC.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 7500 -

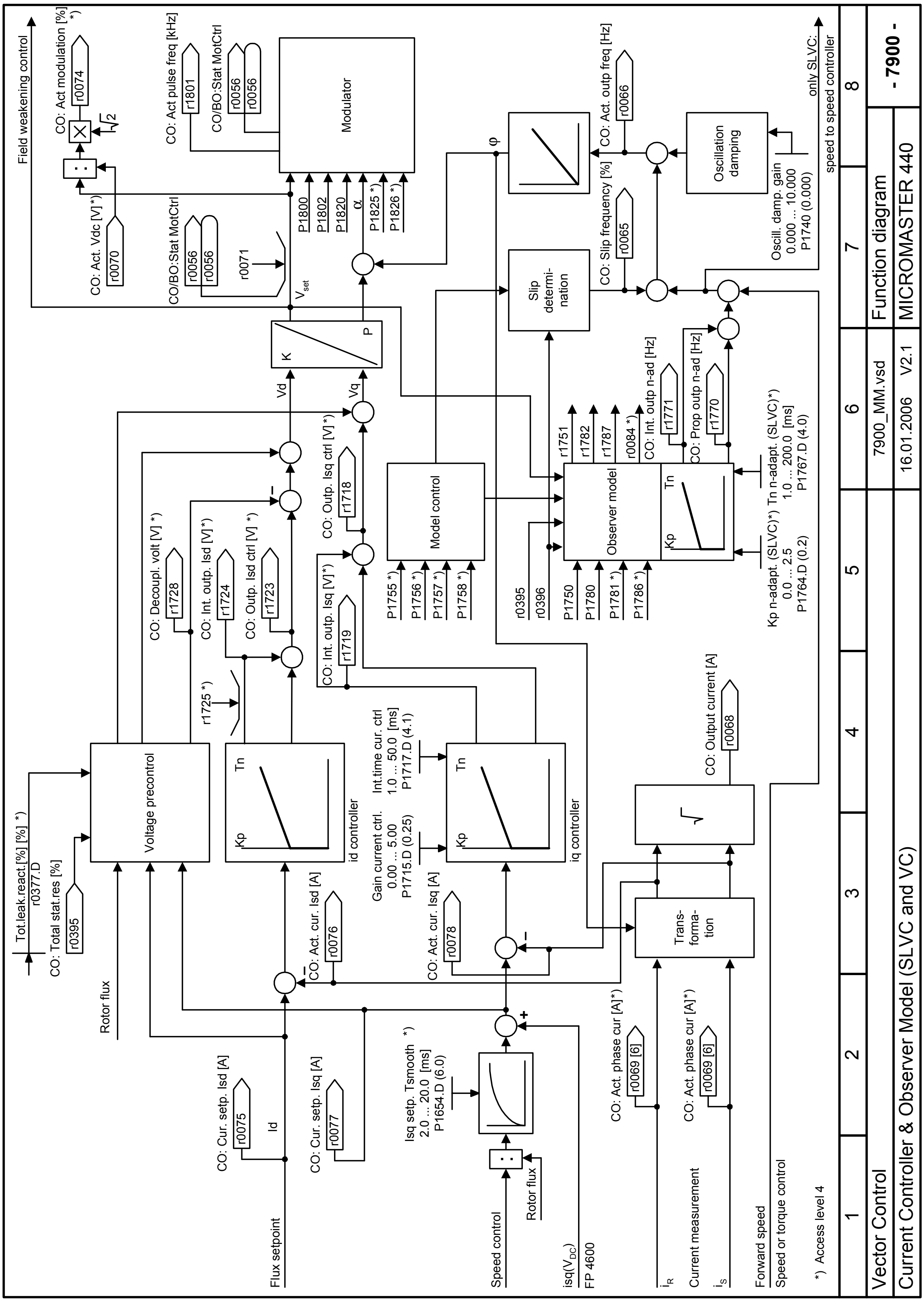

Torque limitation
r1508
FP7710
b
Torque limitation
r0079
FP7710
a
Enable droop
0 ... 1
P1492.D (0)
Ramp generator
Resultant max freq [Hz]
r1084
Speed measurement
*) Access level 4
**) changeable in run via DDS
CO: Act. enc. freq [Hz]
r0061
CO: Act. frequency [Hz]
r0063
CO: Freq. setpoint [Hz]
r0062
CO: Droop freq. [Hz]
r1490
Filter time n_act.
0 ... 32000 [ms]
P1442.D (4)
Inertia [kg*m^2]
0.00010 ... 1000.00000
P0341.D (0.00180)
Tot/mot inert.rat.
1.000 ... 400.000
P0342.D (1.000)
Scal acc. prectrl.
0.0 ... 400.0 [%]
P1496.D (0.0)
Droop scaling
0.00 ... 0.50
P1489.D (0.05)
Droop input source
0 ... 3
P1488.D (0)
CO: Accel. torque [Nm]
r1518
CO: f_act filt 2 [Hz] *)
r1445
CO: Freq. setp ctl [Hz]
r1438
CO: Dev. freq ctrl [Hz]
r0064
Gain of n-ctrl. **)
0.0 ... 2000.0
P1460.D (3.0)
Tn of n-ctrl. **)
25 ... 32001 [ms]
P1462.D (400)
Kp
Tn
BI: Set integrator
P1477.C
(0:0)
CI: Set int. value
P1478.C
(0:0)
Config. of n-ctrl.
0 ... 3
P1400.D (1)
r1538
r1539
CO:Int.outp n-ctrl [Nm]
r1482
Speed precontrol
Torque limitation
FP7710
Speed controller output
Torque limitation
FP7710
Forward speed
Observer model
FP7900
1
2
3
4
5
6
7
8
Vector Control
Speed Controller with Encoder (VC):
P1300 = 21 and P1501 = 0
7510_VC.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 7510 -

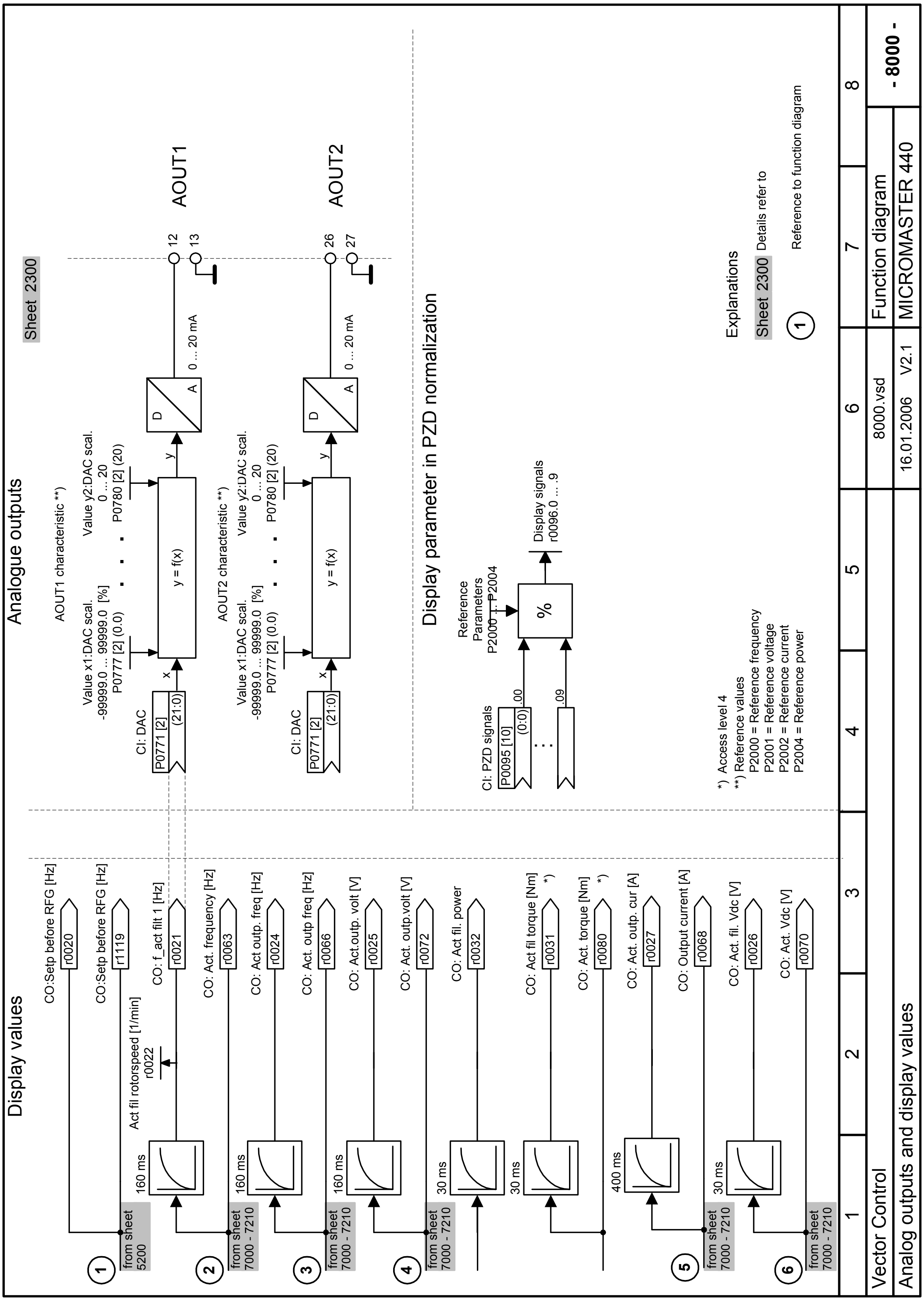


CI: Add. trq. setp **)
P1511.C
(0:0)
Speed precontrol
FP7500
BI:-> torque ctrl.
P1501.C
(0:0)
CI: Torque setp. **)
P1503.C
(0:0)
Speed controller output
FP7500
CO: Add. trq. setp
r1515
CO: Accel. torque
r1518
enable
Scal acc. trq ctrl
0.0 ... 400.0 [%]
P1499.D (100.0)
Inertia [kg*m^2]
0.00010 ... 1000.00000
P0341.D (0.00180)
Tot/mot inert.rat.
1.000 ... 400.000
P0342.D (1.000)
Resultant max freq [Hz]
r1084
Forward speed
Observer model
FP7900
CO/BO: Stat 2 ctrl
r1407
r1407.8
FP7900
Current control
and FP7500
CO: Total trq setp [Nm]
r0079
r1407
r1407.9
CO/BO: Stat 2 ctrl
r1538
CO:Total up TrqLim
r1539
CO:Total lw TrqLim
r1536
CO:Max trq mot cur *)
r1537
CO:Max trq reg cur *)
Speed limitation controller (only for torque control)
MIN
MAX
MIN
MAX
-1
r1538
r1539
CO: Torque setp.
r1508
FP7500
Motor stall protection
Imax
Id
Flux setpoint
CO: Upper trq. lim
r1526
CO: Lower trq. lim
r1527
Power limitation
M [Nm] = 1000 · P [kW] / 2 · π · f
Regener. power lim
-8000.00 ... 0.00
P1531.D (-0.12)
Motoring power lim
0.00 ... 8000.00
P1530.D (0.12)
act. frequency
CO: Outp cur limit
r0067
Motor temperature
Inverter temperature
i²t inverter
Rated mot. current
0.01 ... 10000.00 [A]
P0305.D (3.25)
Motor ovl fact [%]
10.0 ... 400.0 [%]
P0640.D (150.0)
CO: Upper trq. lim
-99999.00 ... 99999.00 [Nm]
P1520.D (5.13)
CI: Upper trq. lim
P1522.C
(1520:0)
Scal. low trq. lim
-400.0 ... 400.0 [%]
P1525.D (100.0)
CO: Lower trq. lim
-99999.00 ... 99999.00 [Nm]
P1521.D (-5.13)
CI: Lower trq. lim
P1523.C
(1521:0)
*) Access level 4
**) selectable with P1500
1 2 3 4 5 6 7 8
Vector Control
Torque Controller and Torque Limitation (SLVC)
7700_TC.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 7700 -


Vector Control
Torque Controller and Torque Limitation (VC)
Function diagram
MICROMASTER 440
- 7710 -
7710_TC.vsd
16.01.2006 V2.1
Speed precontrol
FP7510
BI:-> torque ctrl.
P1501.C
(0:0)
CI: Torque setp. **)
P1503.C
(0:0)
Speed controller output
FP7510
CO: Accel. torque
r1518
Rated mot. current
0.01 ... 10000.00 [A]
P0305.D (3.25)
Motor ovl fact [%]
10.0 ... 400.0 [%]
P0640.D (150.0)
Motor temperature
Inverter temperature
i²t inverter
CO: Outp cur limit
r0067
Imax
Flux setpoint
Id
Motor stall protection
CO: Upper trq. lim
-99999.00 ... 99999.00 [Nm]
P1520.D (5.13)
CI: Upper trq. lim
P1522.C
(1520:0)
CO: Lower trq. lim
-99999.00 ... 99999.00 [Nm]
P1521.D (-5.13)
CI: Lower trq. lim
P1523.C
(1521:0)
Scal. low trq. lim
-400.0 ... 400.0 [%]
P1525.D (100.0)
CO: Upper trq. lim
r1526
CO: Lower trq. lim
r1527
CO/BO: Stat 2 ctrl
r1407
r1407.8
r1407.9
r1538
r1539
FP7510
r1508
CO: Torque setp.
Power limitation
M [Nm] = 1000 · P [kW] / 2 · π · f
Regener. power lim
-8000.00 ... 0.00
P1531.D (-0.12)
Motoring power lim
0.00 ... 8000.00
P1530.D (0.12)
act. frequency
MIN
MAX
-1
Speed limitation controller (only for torque control)
FP7900
Current control
and FP7510
r0079
CO: Total trq setp [Nm]
r1538
CO:Total up TrqLim
r1539
CO:Total lw TrqLim
r1536
CO:Max trq mot cur *)
r1537
CO:Max trq reg cur *)
*) Access level 4
**) selectable with P1500


Vector Control
Flux Setpoint (SLVC and VC)
Function diagram
MICROMASTER 440
7800_VC.vsd
16.01.2006 V2.1
- 7800 -
1
2
3
4
5
6
7
8
CO: Act. fil. Vdc [V]
r0026
Vdc measurement
Vsetp.
Current control
CO: Fval flux setp
50.0 ... 200.0 [%]
P1570.D (107.0)
Act. frequency
Efficiency optimiz
0 ... 100 [%]
P1580.D (0)
Cont. torque boost
0.0 ... 200.0 [%]
P1610.D (50.0)
Acc trq boost SLVC
0.0 ... 200.0 [%]
P1611.D (0.0)
CO: Torque setp. [Nm]
r1508
Speed control
*) Access level 4
Max. modulation *)
20.0 ... 150.0 [%]
P1803.D (106.0)
Dyn. volt headroom
0 ... 150 [V]
P1574.D (10)
CO: Max. outp.volt [V]
r0071
CO/BO:Stat MotCtrl
r0056
r0056
Field weakening characteristic
Efficiency optimization
Rotor time const. [ms]
r0384.D
Rated magnet. cur. [A]
r0331.D
MIN
Magnetization time
0.000 ... 20.000 [s]
P0346.D (1.000)
30 ms
Int.time weak.ctrl
20 ... 32001 [ms]
P1596.D (50)
Field weakening controller
CO:Outp.weak. ctrl [%] *)
r1597
Motor model StatWd
r1751
Flux setp. Tsmooth
4 ... 500 [ms]
P1582.D (15)
Flux setpoint generation
CO: Smoothed setp. [%] *)
r1583
CO:Total flux setp [%]
r1598
Saturation characteristic
P0362 ... P0369 *)
Id
Current control and stall protection


Vector Control
Current Controller & Observer Model (SLVC and VC)
Function diagram
MICROMASTER 440
- 7900 -
7900_MM.vsd
16.01.2006 V2.1
Flux setpoint
Speed control
Rotor flux
isq(V_DC)
FP 4600
Current measurement
Forward speed
Speed or torque control
*) Access level 4
CO: Cur. setp. Isd [A]
r0075
CO: Cur. setp. Isq [A]
r0077
Isq setp. Tsmooth *)
2.0 ... 20.0 [ms]
P1654.D (6.0)
CO: Act. phase cur [A]*)
r0069 [6]
CO: Act. cur. Isd [A]
r0076
CO: Act. cur. Isq [A]
r0078
Trans-forma-tion
CO: Output current [A]
r0068
Gain current ctrl.
0.00 ... 5.00
P1715.D (0.25)
Int.time cur. ctrl
1.0 ... 50.0 [ms]
P1717.D (4.1)
id controller
iq controller
Voltage precontrol
Tot.leak.react.[%] [%] *)
r0377.D
CO: Total stat.res [%]
r0395
r1725 *)
CO: Decoupl. volt [V] *)
r1728
CO: Int. outp. Isd [V]*)
r1724
CO: Outp. Isd ctrl [V] *)
r1723
CO: Int. outp. Isq [V]*)
r1719
CO: Outp. Isq ctrl [V]*)
r1718
Model control
P1755 *)
P1756 *)
P1757 *)
P1758 *)
Observer model
r0395
r0396
P1750
P1780
P1781 *)
P1786 *)
r1751
r1782
r1787
r0084 *)
CO: Int. outp n-ad [Hz]
r1771
CO: Prop outp n-ad [Hz]
r1770
Kp n-adapt. (SLVC)*)
0.0 ... 2.5
P1764.D (0.2)
Tn n-adapt. (SLVC)*)
1.0 ... 200.0 [ms]
P1767.D (4.0)
Slip determi-nation
CO: Slip frequency [%]
r0065
CO: Act. outp freq [Hz]
r0066
Oscillation damping
Oscill. damp. gain
0.000 ... 10.000
P1740 (0.000)
only SLVC:
speed to speed controller
Modulator
P1800
P1802
P1820
α
P1825 *)
P1826 *)
CO: Act pulse freq [kHz]
r1801
CO/BO:Stat MotCtrl
r0056
CO: Act. Vdc [V]*)
r0070
r0071
CO: Act modulation [%]
r0074
Field weakening control
Vd
Vq
V_set
φ



Display values
Analogue outputs
Sheet 2300
AOUT1 characteristic **)
Value x1:DAC scal.
-99999.0 ... 99999.0 [%]
P0777 [2] (0.0)
Value y2:DAC scal.
0 ... 20
P0780 [2] (20)
CI: DAC
P0771 [2]
(21:0)
y = f(x)
0 ... 20 mA
12
13
AOUT1
AOUT2 characteristic **)
26
27
AOUT2
Display parameter in PZD normalization
CI: PZD signals
P0095 [10]
(0:0)
Reference Parameters
P2000 ... P2004
%
Display signals
r0096.0 9
*) Access level 4
**) Reference values
P2000 = Reference frequency
P2001 = Reference voltage
P2002 = Reference current
P2004 = Reference power
Explanations
Sheet 2300 Details refer to
Reference to function diagram
CO:Setp before RFG [Hz]
r0020
r1119
Act fil rotorspeed [1/min]
r0022
CO: f_act filt 1 [Hz]
r0021
CO: Act. frequency [Hz]
r0063
CO: Act outp. freq [Hz]
r0024
CO: Act. outp freq [Hz]
r0066
CO: Act.outp. volt [V]
r0025
CO: Act. outp.volt [V]
r0072
CO: Act fil. power
r0032
CO: Act fil torque [Nm]
r0031
CO: Act. torque [Nm]
r0080
CO: Act. outp. cur [A]
r0027
CO: Output current [A]
r0068
CO: Act. fil. Vdc [V]
r0026
CO: Act. Vdc [V]
r0070
160 ms
30 ms
400 ms
from sheet 5200
from sheet 7000 - 7210
Vector Control
Analog outputs and display values
8000.vsd
16.01.2006 V2.1
Function diagram
MICROMASTER 440
- 8000 -

5 Faults and Alarms

5.1 Fault messages

In the event of a failure, the inverter switches off and a fault code appears on the display.

NOTE

To reset the fault code, one of three methods listed below can be used:

1. Cycle the power to the drive.
2. Press the button on the BOP or AOP.
3. Via Digital Input 3 (default setting)

Fault messages are stored in parameter r0947 under their code number (e.g. F0003 = 3). The associated error value is found in parameter r0949. The value 0 is entered if a fault has no error value. It is furthermore possible to read out the point in time that a fault occurred (r0948) and the number of fault messages (P0952) stored in Parameter r0947.

F0001 Overcurrent STOP II

Quit

Remove fault and reset fault memory by disconnecting the
- drive converter from the line supply and powering-up again
- Press the Fn key on the BOP or AOP
- Acknowledge fault P2103, P2104
- P0952 (complete fault memory)

Cause
- short-circuit at the output
- ground fault
- excessively large motor (the motor power rating P0307 is greater than the inverter power r0206)
- defective final stage (end stage)

Diagnosis & Remedy

Please check the following:
- are the cable lengths within the limit values ?
- does the motor cable or motor have either a short-circuit or ground fault ?
- do the motor parameters correspond to those of the motor being used ?
- is the motor overloaded or stalled (locked rotor) ?
- increase the accelerating time.
- reduce the gain
- use a motor with a lower power rating
- is the stator resistance value (P0350) correct ?

F0002 Overvoltage STOP II

Quit

Refer to F0001

Cause
- DC link voltage (r0026) higher than the overvoltage threshold (refer to parameter r0026)
- ground fault

Diagnosis & Remedy

Please check the following:
- is the line supply voltage within the permissible range?
- has the DC current DC link monitoring been enabled (P1240) and correctly parameterized?
- extend the deceleration ramp (ramp-down time P1121, P1135)
- remove the ground fault
- is the required braking power within the permissible limits?

NOTE
- a higher moment of inertia requires longer deceleration times; if required, use a braking resistor.
- overvoltage can either be caused by an excessively high line supply voltage or by the fact that the motor is generating (regenerative mode).
- the motor can be generating as it is decelerating quickly or due to the fact that an active load is driving the motor.

F0003 Undervoltage STOP II

Quit
Refer to F0001

Cause
- line voltage failed
- shock stressing outside the permissible limits.

Diagnosis & Remedy
Please check the following:
- is the line supply voltage within the permissible range?
- is the line supply voltage stable with respect to sporadic failures and voltage dips (brown-outs) ?

F0004 Inverter overtemperature STOP II

Quit
Refer to F0001

Cause
- inadequate cooling
- ambient temperature is too high.

ambient temperature is too high.

Diagnosis & Remedy
Please check the following:
- is the pulse frequency P1800 set to the factory setting ? If required reset P1800.
- does the ambient temperature lie within the permissible limits ?
- reduce the load and / or ensure adequate cooling

Please check the following:
- does the fan rotate if the inverter is operational ?

F0005 Inverter I2T STOP II

Quit
Refer to F0001

Cause
- inverter overloaded.
- load duty cycle too high.
- the motor power rating (P0307) is greater than that of the inverter (r0206).
- 100 % overload reached (refer to utilization r0036)

Diagnosis & Remedy
Please check the following:
- does the load duty cycle lie within the permissible limits?
- use a motor with a lower rating (motor power P0307 is greater than Is inverter power r0206)

F0011 Motor overtemperature STOP II

Quit
Refer to F0001

Cause
Motor overloaded

Diagnosis & Remedy
Please check the following:
- is the load cycle correct ?
- are the rated/nominal motor overtemperatures correct (P0626-P0628) ?
- is the alarm threshold correct for the motor temperature (P0604) ?

F0012 No inverter temperature signal STOP I

Quit
Refer to F0001

Cause
- wire breakage of the inverter-temperature sensor (heatsink)

Diagnosis & Remedy
- replace the inverter

F0015 No motor temperature signal STOP II

Quit

Refer to F0001

Cause

- motor temperature sensor either short-circuited or open-circuit.
- if it is identified that a signal has been lost, then the temperature monitoring changes-over to monitoring based on the thermal-motor model.

F0020 Line supply phase missing STOP II

Quit

Refer to F0001

Cause

- a fault is output if one of the three input phases is missing, the pulses are enabled and a load is present

Diagnosis & Remedy

Please check the following:

- are the power connections ok ?

F0021 Ground fault STOP II

Quit

Refer to F0001

Cause

- the fault occurs if the sum of the phase currents is greater than 5 % of the inverter rated current.

NOTE

- this fault only occurs for inverters with 3 current sensors (sizes D to F, GX, FX).

Diagnosis & Remedy

Please check the following:

- are the connections at the motor terminal boxes o.k. ?
- are the motor cable connections at the inverter o.k. ?

F0022 Hardware monitoring active STOP II

Quit

Refer to F0001

Cause

This fault (r0947 = 22 and r0949 = 1) occurs under the following circumstances:
(1) DC link overcurrent condition = IGBT short-circuit
(2) Braking chopper short-circuit
(3) Ground fault
(4) I/O module not correctly inserted
For the following sizes the above faults can occur:

- size A to C (1),(2),(3),(4)
- size D to E (1),(2), (4)
- size F (1),(2)

The following faults only occur in conjunction with sizes FX / GX:

- UCE faults are identified if r0947 = 22 and the fault value r0949 = 12 or 13 or 14.
- I2C bus error is identified if r0947 = 22 and the fault value r0949 = 21 (power-down and then power-up again).

NOTE

All of these faults are assigned to a signal in the power module. This means that it is not possible to determine which fault actually occurred.

Diagnosis & Remedy

You must first identify as to whether the fault is permanent (i.e. the inverter cannot be started without the fault occurring) or it sporadically occurs (occasionally occurs or under certain operating conditions).
Permanent fault F0022:

- check whether the I/O module is correctly inserted (refer to the Operating Instructions).
- is there a ground fault or short-circuit at the inverter output or at an IGBT?
  You can identify this by disconnecting the motor cable.
  In the case that the fault occurs, if all of the external cables (with the exception from the line supply voltage) are disconnected, then with a high degree of probability, the drive unit is defective and must be repaired.

Sporadic fault F0022:

- this fault should be treated as "overcurrent". If fault F0022 sporadically occurs, the causes can be as follows:
- sudden load changes or mechanical obstructions
- extremely short ramp-up times (accelerating times)
- poor optimization of the sensorless closed-loop vector control
- incorrect braking resistor is installed with an excessively low resistance

F0023 Output fault STOP II

Quit

Refer to F0001

Cause

- one output phase has not been correctly connected.

Diagnosis & Remedy

Please check the following:
- are the connections at the motor terminal box o.k. ?
- are the motor cable connections at the inverter o.k. ?

F0024 Rectifier temperature too high STOP II

Quit

Refer to F0001

Cause

- inadequate cooling
- fan is not operational
- ambient temperature is too high.

Diagnosis & Remedy

Please check the following:
- does the fan rotate when the inverter is powered-up (A0520, A0521) ?
- is the pulse frequency set to the factory setting ? If required, reset.
- is the ambient temperature within the permissible limits (A0520, A0521) ?

F0030 Fan failed STOP II

Quit

Refer to F0001

Cause

- fan no longer functions

Diagnosis & Remedy

- fault cannot be suppressed if an AOP or BOP is connected.
- a new fan is required.

F0035 Restart after n STOP II

Quit

reset fault memory or Power On / Stop

Cause

- restart fault after n attempts, refer to P1211

F0040 Fault, for automatic calibration STOP II

Quit

Refer to F0001

Cause

- a calibration error has occurred for the automatic calibration of the analog inputs / outputs or the current actual value sensing.
- the calibration is only carried-out once in the factory.
- a fault F0040 is therefore only to be expected while the inverter is being manufactured and not in operation.

Diagnosis & Remedy

- change the drive

F0041 Failure, motor data identification STOP II

Quit
Refer to F0001

Cause
Motor data identification run unsuccessful (refer to fault value r0949):
- r0949 = 0: Load missing.
- r0949 = 1: Current limit was reached during the identification run.
- r0949 = 2: Identified stator resistance less than 0.1% or greater than 100%.
- r0949 = 3: Identified rotor resistance less than 0.1% or greater than 100%.
- r0949 = 4: Identified stator reactance less than 50% or greater than 500%
- r0949 = 5: Identified magnetizing reactance less than 50% or greater than 500%
- r0949 = 6: Identified rotor time constant less than 10ms or greater than 5s
- r0949 = 7: Identified total leakage reactance less than 5% or greater than 50%
- r0949 = 8: Identified stator leakage reactance less than 25% or greater than 250%
- r0949 = 9: Identified rotor leakage reactance less than 25% or greater than 250%
- r0949 = 20: Identified IGBT response voltage less than 0.5 or greater than 10V
- r0949 = 30: Current controller at voltage limit value
- r0949 = 40: Identified data set inconsistent; at least one identification run unsuccessful

NOTE
Percentage values based on the impedence Zb = Vmot,rated / sqrt(3) / Imot,rated

Diagnosis & Remedy
Please check the following:
- r0949 = 0: Is the motor connected to the inverter ?
- r0949 = 1-40: Is the motor data in P0304-P0311 correct ?
- r0949 = 1-40: Motor circuit configuration correct (star, delta configuration) ?

F0042 Fault/error when optimizing the speed controller STOP II

Quit
Refer to F0001

Cause
Automatic data identification run unsuccessful (refer to fault value r0949):
- r0949 = 0: Time slice overflow while waiting for a stable speed
- r0949 = 1: No matching/appropriate value when reading

F0051 Parameter EEPROM fault STOP II

Quit
Refer to F0001

Cause
- read or write operation while saving parameters in the EEPROM was unsuccessful.

Diagnosis & Remedy
- reset to factory setting and then re-parameterize
- if required, change the drive

F0052 Power stack fault STOP II

Quit
Refer to F0001

Cause
- read error, power data or invalid power module data.

Diagnosis & Remedy
- change the drive

F0053 I/O EEPROM fault STOP II

Quit
Refer to F0001

Cause
- fault with I/O EEPROM read operation or invalid data.

Diagnosis & Remedy
Please check the following:
- check I/O data and if required repeat the operation
- the installation of the I/O module in the inverter if required, replace the I/O module

F0054 Incorrect I/O module STOP II

Quit
Refer to F0001

Cause
- incorrect I/O module inserted.
- no ID of the I/O module found, no data.

Diagnosis & Remedy
Please check the following:
- check I/O data, if required repeat the operation
- the installation of the I/O module in the inverter if required, replace the I/O module

F0060 Asic time slice overflow STOP II

Quit
Refer to F0001

Cause
- internal communications failure/error

Diagnosis & Remedy
- if the error still occurs, replace the inverter.
- contact customer service!

F0070 CB setpoint fault STOP II

Quit
Refer to F0001

Cause
- no setpoints received via the communications bus during the telegram failure time.

Diagnosis & Remedy
- check the communications module (CB) and communications partner.

F0071 USS(BOP link) setpoint fault STOP II

Quit
Refer to F0001

Cause
- no setpoint was received via the USS during the telegram off time

Diagnosis & Remedy
- check USS master

F0072 USS(COMM link) setpoint fault STOP II

Quit
Refer to F0001

Cause
- no setpoints received via the USS during the telegram off time

Diagnosis & Remedy
- check USS master

F0080 ADC input signal lost STOP II

Quit
Refer to F0001

Cause
- wire breakage
- signal outside the limit values

F0085 External fault STOP II

Quit
Refer to F0001

Cause
- external fault as a result of command input via terminals.

Diagnosis & Remedy
- inhibit terminal input to initiate fault.

F0090 Signal loss, encoder STOP II

Quit
Refer to F0001

Cause
- encoder signal between the encoder and inverter is interrupted
- excessively large difference between the setpoint (reference) and actual frequency

Diagnosis & Remedy
Please check the following:
- is there an integrated encoder? If there is no integrated encoder, then set P0400 = 0 and select the operating mode sensorless closed-loop vector control (P1300 = 20 or 22)
- the connection between the encoder and the inverter
- is the encoder faulty? (select P1300 = 0, operation with fixed speed, check the encoder signal in r0061)
- increase the encoder signal threshold in P0492, P0494

F0101 Stack overflow STOP II

Quit
Refer to F0001

Cause
- software error or processor failure

Diagnosis & Remedy
- carry-out self-test routines

F0221 PID feedback below the minimum value STOP II

Quit
Refer to F0001

Cause
- PID feedback below the minimum value P2268.

Diagnosis & Remedy
- change value of P2268.
- set feedback gain.

F0222 PID feedback above maximum value STOP II

Quit
Refer to F0001

Cause
- PID feedback above maximum value P2267.

Diagnosis & Remedy
- change value of P2267.
- set the feedback gain.

F0422 No load applied to inverter STOP II

Quit
Refer to F0001

Cause
No Load is applied to the inverter.
As a result, some functions may not work as under normal load conditions.

F0450 Failure BIST tests STOP II

Quit
Refer to F0001

Cause
Self-test routine unsuccessful (refer to fault value r0949):
- r0949 = 1: Self-test routine for power module components unsuccessful
- r0949 = 2: Self-test routine for closed-loop control module components unsuccessful
- r0949 = 4: Several function tests were unsuccessful
- r0949 = 8: Several tests carried-out at the I/O module were unsuccessful (only MICROMASTER 420)
- r0949 = 16: Failure of the internal RAM at the switch-on test

Diagnosis & Remedy
- the drive is functional, but several functions are not correctly executed.
- replace the drive

F0452 Load torque fault detected STOP II

Quit

Refer to F0001

Cause

- load conditions at the motor signify a load torque fault (e.g. belt failure) or a mechanical fault

Diagnosis & Remedy

Please check the following:

- no braking, failure or destruction of the mechanical drive transmission line
- if required, lubricate the mechanical drive transmission line.

If you are using an external encoder, please check the following parameter settings:

- P2192 (delay time, load torque monitoring)

If you are operating within a specific speed range, please check the following:

- P2182 (load torque monitoring F1)
- P2183 (load torque monitoring F1f2)
- P2184 (load torque monitoring F1f3)
- P2185 (upper torque threshold 1)
- P2186 (lower torque threshold 1)
- P2187 (upper torque threshold 2)
- P2188 (lower torque threshold 2)
- P2189 (upper torque threshold 3)
- P2190 (lower torque threshold 3)
- P2192 (delay time, load torque monitoring)

F0453 Motor stalled STOP II

Quit

Refer to F0001

Cause

- up/ or down ramp too steep (excessive gradient)
- inverter connected to an already spinning motor without using the flying restart function
- motor incorrectly connected
- motor too small
- voltage boost P1611 for sensorless vector control too low

Diagnosis & Remedy

Please check the following:

- the motor connections
- increase the ramp-up time P1120 or the ramp-down time P1121
- activate the flying restart function P1200
- use a larger motor
- increase the voltage boost P1611 for sensorless closed-loop vector control
- use closed-loop vector control with encoder instead of sensorless closed-loop vector control.
- activate the V/f closed-loop control mode (P1300 less than 20) instead of closed-loop vector control

5.2 Alarm Messages

Alarm messages are stored in parameter r2110 under their code number (e.g. A0503 = 503) and can be read out from there.

A0501 Current limit value

Cause
- the motor power rating does not correspond to the inverter power rating
- motor cables are too long
- ground fault

Diagnosis & Remedy
Please check the following:
- does the motor power rating (P0307) match the inverter power rating (r0206) ?
- are the limit values for the cable lengths maintained ?
- does the motor cable or motor have a short-circuit or ground fault ?
- do the motor parameters correspond to those of the motor being used ?
- stator resistance value (P0350) correct ?
- is the motor overloaded or is the rotor locked (cannot rotate) ?
- ramp-up time P1120 too low ?

A0502 Overvoltage limit value

Cause
- the overvoltage limit value has been reached (actual value of the DC link voltage r0026 greater than r1242).

Diagnosis & Remedy
- if this alarm is permanently displayed, check the inverter input voltage.
- is the DC link voltage controller (Vdc_max controller) de-activated (refer to parameter P1240) ?
- short ramp times and/or large flywheel masses (moment of inertia) ?

A0503 Undervoltage limit value

Cause
- line supply has failed.
- line voltage and therefore also the DC link voltage (r0026) below the defined limit value (refer to parameter r0026).

Diagnosis & Remedy
- check the line voltage.

A0504 Inverter overtemperature

Cause
- alarm threshold of the inverter heatsink temperature (P0614) was exceeded; this results in a reduction of the pulse frequency and/or the output frequency (dependent on the parameterization in (P0610).

Diagnosis & Remedy
Please check the following:
- is the ambient temperature within the permissible limits ?
- are the load and load duty cycle within the permissible limits ?

A0505 Inverter I2T

Cause
- overload alarm limit P0294 is exceeded (refer to utilization r0036)
- the pulse frequency and/or the output frequency is reduced as a function of the setting of parameter P0290.

Diagnosis & Remedy
- check whether the load duty cycle lies within the permissible limits.

A0506 Inverter load duty cycle

Cause
- difference between the temperature at the heatsink and IGBT exceeds the alarm limit values.

Diagnosis & Remedy
- please ensure that the load duty cycle and load surge lie within the permissible limits.

A0510 Motor overtemperature

A0511 Motor overtemperature

Cause
- motor is overloaded.
- load duty cycle is exceeded.

Diagnosis & Remedy

Check, independently of the type of temperature monitoring:
- P0604 alarm threshold, motor overtemperature
- P0625 motor ambient temperature

If P0601 = 0 or 1, please check the following:
- is the motor data correct (rating plate)?, if not, carry-out a fast commissioning routine
- precise temperature values from the motor identification routine (P1910=1).
- is the motor weight correct (P0344)?
- the permissible overtemperature can be changed using P0626, P0627, P0628, if the motor is not a standard Siemens motor.

If P0601 = 2, then please check the following:
- is the temperature displayed in r0035 plausible?
- is an KTY84 temperature sensor being used? (others are not supported).

A0520 Rectifier overtemperature

Cause
- alarm threshold of the rectifier heatsink exceeded.

Diagnosis & Remedy

Please check the following:
- is the ambient temperature within the permissible range ?
- are the load and load duty cycle within the permissible range ?
- does the fan operate if the inverter is operational ?

A0521 Ambient temperature too high

Cause
- alarm threshold of the permissible ambient temperature exceeded.

Diagnosis & Remedy

Please check the following:
- is the ambient temperature within the permissible range ?
- does the fan operate if the inverter is operational ?
- is the air feed to the fan obstructed ?

A0522 Read I2C, time exceeded

Cause
- cyclic access to UCE values and power module data via i2c bus (only for sizes FX and GX) is faulted.

A0523 Output fault

Cause
- an output cable is not connected.

Diagnosis & Remedy
- alarm can be suppressed.

A0535 Brake resistor hot

Cause
- the load duty cycle of the braking resistor has been exceeded.
- when the load duty cycle is exceeded, then it is automatically limited to the value P1237.

Diagnosis & Remedy
- use a braking resistor with higher power rating / higher load duty cycle.

A0541 Motor data identification routine active

Cause
- motor data identification routine (P1910) selected and is active

A0542 Speed controller optimization running

Cause
- speed controller optimization (P1960) is selected and is presently active.

A0590 Alarm, no signals from the speed encoder

Cause
- no speed encoder signals
- inverter has changed-over to encoderless vector control.

Diagnosis & Remedy
Stop the inverter, and
- check the speed encoder, if an encoder is not being used, set P0400 to 0 and select the sensorless closed-loop vector control mode (P1300 = 20 or 22)
- check the encoder connections
- check whether the encoder is operating correctly (set P1300 = 0 and operate the drive at a fixed speed and check the encoder signal in r0061
- increase the permissible speed deviation in P0492

A0600 RTOS data loss alarm

Cause
- time slice overflow was identified

Diagnosis & Remedy
- use lower baud rate for USS
- de-activate inverter functions

A0700 CB alarm 1

Cause
- CB-(communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0701 CB alarm 2

Cause
- CB-(communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0702 CB alarm 3

Cause
- CB-(communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0703 CB alarm 4

Cause
- CB-(communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0704 CB alarm 5

Cause
- CB-(communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0705 CB alarm 6

Cause
- CB-(Communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0706 CB alarm 7

Cause
- CB-(Communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0707 CB alarm 8

Cause
- CB-(Communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0708 CB alarm 9

Cause
- CB-(Communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0709 CB alarm 10

Cause
- CB-(Communications module)-specific

Diagnosis & Remedy
- refer to the CB User Manual

A0710 CB communications error

Cause
- loss of communications with the CB (communications module)

Diagnosis & Remedy
- check the CB hardware

A0711 CB communications error

Cause
- CB (communications module) signals a communications error.

Diagnosis & Remedy
- check the CB parameters

A0910 Vdc-max controller disabled/switched-out

Cause
- Vdc max controller was de-activated, as it was not able to keep the DC link voltage (r0026) within the limit values (refer to r0026 and P1240).

This occurs,
- if the line supply voltage is permanently too high.
- if the motor is driven by an active load, which means that the motor goes into regenerative operation.
- while decelerating (short down-ramps P1121) for extremely high load torques

Diagnosis & Remedy

Please check the following:
- is the input voltage (P0756) within the permissible range ?
- are load duty cycle and load limits within the permissible limits ?

A0911 Vdc-max controller active

Cause
- Vdc max controller is active
- the ramp-down times are automatically increased in order to keep the DC link voltage (r0026) within the limit values (refer to r0026 and P1240).

A0912 Vdc-min controller active

Cause
- Vdc min controller is activated, if the DC link voltage (r0026) falls below the minimum value (refer to r0026 or P1240).
- the kinetic energy of the motor is used to buffer the DC link voltage and therefore to slow down the drive.
- therefore brief line failures no longer automatically result in an undervoltage trip.

A0920 ADC parameters not correctly set

Cause

ADC parameters should not be set to identical values, as this would lead to illogical results.
- Index 0: Parameter settings for output identical.
- Index 1: Parameter settings for input identical.
- Index 2: Parameter settings for input do not correspond to ADC type.

A0921 DAC parameters not set properly

Cause
- DAC parameters (P0777 and P0779) have identical values.

OR
- DAC parameters (P0778 and P0780) have identical values.

Identical values would produce illogical results.

Diagnosis & Remedy

Check the following:
- Output parameter settings. Ensure P0777 and P0779 are not identical.
- Input parameter settings. Ensure P0778 and P0780 are not identical.

A0922 No load at the inverter

Cause
- no load is connected to the inverter.
- therefore several functions can run differently than under normal load conditions.

A0923 JOG counter-clockwise as well as JOG clockwise are requested

Cause
- both JOG clockwise and JOG counter-clockwise (P1055/P1056) have been requested. This is the reason that the RFG output frequency has been frozen to the actual value.

A0952 Load fault detected

Cause
- load conditions at the motor indicate a load fault or mechanical fault.

Diagnosis & Remedy

Please check the following:
- no braking, failure or destruction of the mechanical transmission line
- if required, lubricate the mechanical transmission line.

If you are using an external encoder, please check the following parameter settings:
- P2192 (delay time, load torque monitoring)

If you are using a specific speed range, then please check the following:
- P2182 (load torque monitoring F1)
- P2183 (load torque monitoring F1f2)
- P2184 (load torque monitoring F1f3)
- P2185 (upper torque threshold 1)
- P2186 (lower torque threshold 1)
- P2187 (upper torque threshold 2)
- P2188 (lower torque threshold 2)
- P2189 (upper torque threshold 3)
- P2190 (lower torque threshold 3)
- P2192 (delay time, load torque monitoring)

A0936 PID auto tuning active

Cause
- PID auto tuning (P2350) is selected or is presently running.

Diagnosis & Remedy
- after automatic PID optimization has been completed, the alarm is reset.

6 Abbreviations

AC	Alternating current
AD	Analog digital converter
ADC	Analog digital converter
ADR	Address
AFM	Additional frequency modification
AG	Automation unit
AIN	Analog input
AOP	Advanced operator panel
AOUT	Analog output
ASIC	Application-specific integrated circuit
ASP	Analog setpoint
ASVM	Asymmetric space vector modulation
BCC	Block check character
BCD	Binary-coded decimal code
BI	Binector input
BICO	Binector / connector
BO	Binector output
BOP	Basic operator panel
C	Commissioning
CB	Communication board
CCW	Counter-clockwise
CDS	Command data set
CI	Connector input
CM	Configuration management
CMD	Commando
CMM	Combimaster
CO	Connector output
CO/BO	Connector output / Binector output
COM	Common (terminal that is connected to NO or NC)
COM-Link	Communication link
CT	Commissining, ready to run
CT	Constant torque
CUT	Commissining, run, ready to run
CW	Clockwise
DA	Digital analog converter
DAC	Digital analog converter
DC	Direct current
DDS	Drive data set
DIN	Digital input
DIP	DIP switch
DOUT	Digital output
DS	Drive state
EEC	European Economic Community
EEPROM	Electrical erasable programmable read-only memory
ELCB	Earth leakage circuit breaker

EMC	Electro-magnetic compatibility
EMF	Electromotive force
EMI	Electro-magnetic interference
ESB	Equivalent circuit
FAQ	Frequently asked questions
FB	Function block
FCC	Flux current control
FCL	Fast current limit
FF	Fixed freqeuncy
FFB	Free function block
FOC	Field orientated control
FSA	Frame size A
GSG	Getting started guide
GUI ID	Global unique identifier
HIW	Main actual value
HSW	Main setpoint
HTL	High-threshold logic
I/O	Input and output
IBN	Commissioning
IGBT	Insulated gate bipolar transistor
IND	Sub-index
JOG	Jog
KIB	Kinetic buffering
LCD	Liguid crystal display
LED	Light emitting diode
LGE	Length
MHB	Motor holding brake
MM4	MICROMASTER 4th. Generation
MOP	Motor potentiometer
NC	Normally closed
NO	Normally open
NPN	Negative positive negative
OPI	Operating instructions
PDS	Power drive system
PID	PID controller (proportional, integral, derivative)
PKE	Parameter ID
PKW	Parameter ID value
PLC	Programmable logic controller
PLI	Parameter list
PNP	Positive negative positive
POT	Potentiometer
PPO	Parameter process data object
PTC	Positive temperature coefficient
PWE	Parameter value
PWM	Pulse-width modulation
PX	Power extension
PZD	Process data
QC	Quick commissioning
RAM	Random-access memory

RCCB	Residual current circuit breaker
RCD	Residual current device
RFG	Ramp function generator
RFI	Radio-frequency interference
RPM	Revolutions per minute
SCL	Scaling
SDP	Status display panel
SLVC	Sensorless vector control
STW	Control word
STX	Start of text
SVM	Space vector modulation
TTL	Transistor-transistor logic
USS	Universal serial interface
VC	Vector control
Vdc	DC-link voltage
VT	Variable torque
ZSW	Status word
ZUSW	Additional setpoint

Suggestions and/or Corrections

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